

# WORLD

CITIES BY

# DESIGN

MMXVI



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HANGHAI,  
SAN FRANCISCO

HOW ENGINEERS, ARTISTS,  
SCIENTISTS, AND THE WORLD'S  
LEADING ARCHITECT ARE  
BUILDING THE URBAN FUTURE

HACK T  
HE GRI  
D | OCT  
2015



# Enough about us. Let's talk about you for a minute.

There is the relaxed you (hopefully we'll be seeing that you a little more often). There is the sporty you (the you who can dodge and weave



and go go go). And then there is the intelligent, dependable, everyday you. This is the one who knows that all of you need their vehicle to be versatile, responsive and smart enough to adapt to whichever one of you is behind the wheel. Three driving modes that, all together, deliver the feeling of control, comfort and — wait for it — connection. It's just one (well, three actually) of the impressive innovations you'll find on the entirely new Lincoln MKX.

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This is the Microsoft Cloud.





The background of the advertisement is a detailed, close-up photograph of a Cartier Clé de Cartier watch movement. The movement is a complex assembly of metal parts, including gears, plates, and a large, polished red crown on the right side. The watch is shown from a side-on perspective, highlighting the intricate mechanical design and the fluid lines of the case. The text is overlaid on the lower half of the image.

# *Cartier*

CLÉ DE CARTIER  
MANUFACTURE MOVEMENT 1847 MC

ESTABLISHED IN 1847, CARTIER CREATES EXCEPTIONAL WATCHES THAT COMBINE DARING DESIGN AND WATCHMAKING SAVOIR-FAIRE. CLÉ DE CARTIER OWES ITS NAME TO ITS UNIQUE CROWN. CONSIDERABLE MASTERY WAS REQUIRED TO CREATE FLUID LINES AND A HARMONIOUS ENSEMBLE, A TESTAMENT TO ACCURACY AND BALANCE. A NEW SHAPE IS BORN.









**KENNETH COLE**





**RHYMEFEST**  
HUMANITARIAN HIP-HOP ARTIST

ABANDONED BY HIS FATHER, HE GREW UP  
TO BECOME THE ROLE MODEL HE NEVER HAD...  
**LOOK GOOD, FOR GOOD.**

Introducing **THE COURAGEOUS CLASS** at [KennethCole.com](http://KennethCole.com)



A group of six men and a dog standing in front of a shop. Five of the men are wearing light blue short-sleeved shirts with patches and dark trousers. One man in the center is wearing a tan t-shirt and jeans. A large brown dog is sitting in front of them. The background shows a shop with large windows and a brick sidewalk.

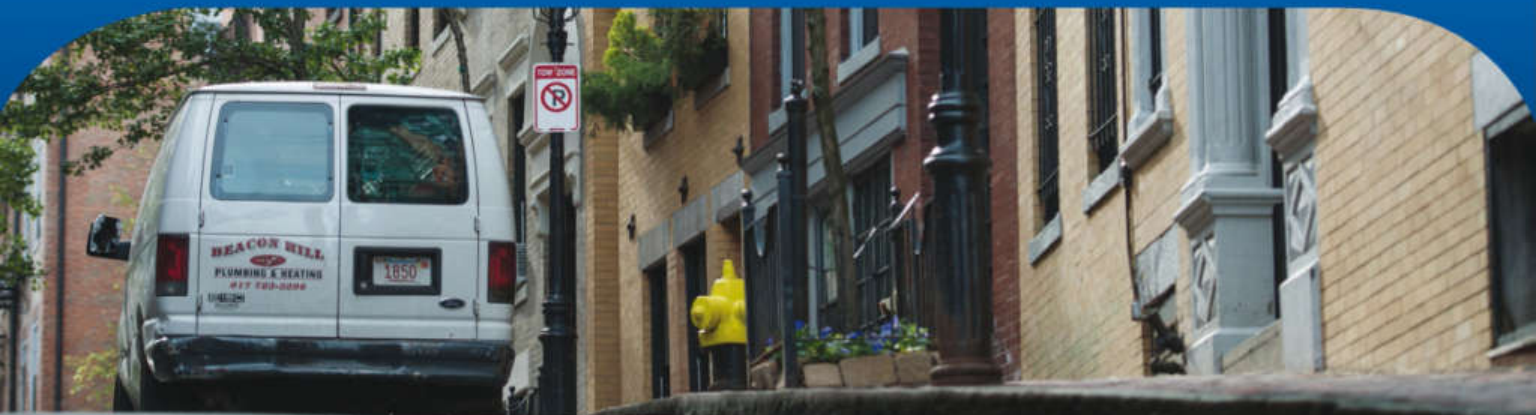
THEY MAY BE  
CALLED SMALL BUSINESSES,  
BUT THEIR IMPACT IS HUGE.

In the United States, over 50% of the working population is employed by small businesses. How can we make sure these companies grow and thrive?

Fleetmatics' mobile workforce solutions are making small vehicle-dependent businesses more competitive and efficient. But to help entrepreneurs everywhere, Fleetmatics needed a global bank. Working with Citi was critical to their growth. Now, they are not only helping improve productivity and create jobs in the U.S., but throughout the world.

For over 200 years, Citi's job has been to believe in people and help make their ideas a reality.

[citi.com/progress](http://citi.com/progress)

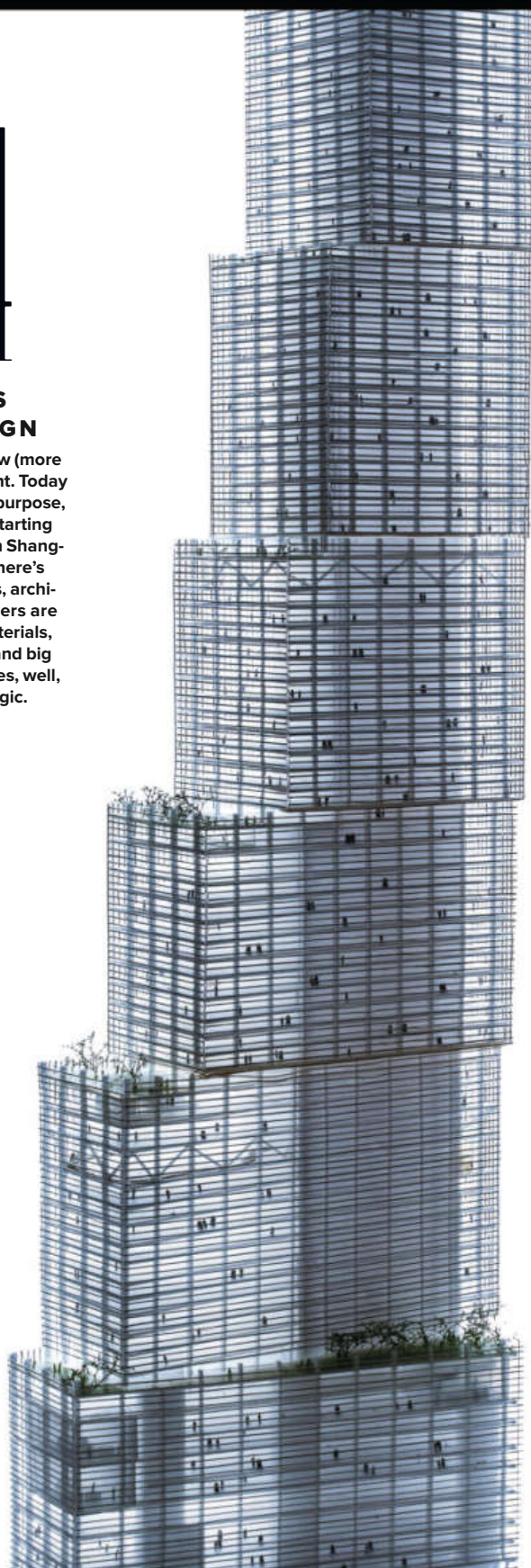




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CITIES  
BY DESIGN

They used to grow (more or less) by accident. Today cities happen on purpose, and things are starting to get good. From Shanghai to Nairobi, here's where designers, architects, and planners are using better materials, smart science, and big data to make cities, well, a little bit magic.



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If you watched Apple's WWDC keynote in June, you saw WIRED featured in Apple's demo of the iOS 9 News app. The app is now live, and we're thrilled to bring you WIRED in a beautiful package for all your iOS devices.

## VIDEO



## Monsters of Nature

Our Absurd Creature of the Week column now has a companion video series. Get up close with terrifying beasts like the tarantula hawk wasp.

ON THE WEB: [video.wired.com](http://video.wired.com)

## WEB + PRINT

## The Future of Football

WIRED and *Sports Illustrated* are teaming up to explore the future of football in our new series. From science-driven training (see page 72) to virtual reality, we'll peer over the pigskin horizon. Don't miss a play. ON THE WEB: [wired.com/sb100](http://wired.com/sb100)

**SB 100**  
**WIRED** | **Sports Illustrated**

## SOCIAL + WEB

## The Race to the White House

Once upon a time, it took a scandal the size of Watergate to sink a president. Today it could be something as big as encrypted emails or as small as an embarrassing Vine. Either way, WIRED staff writer Issie Lapowsky will be watching. She's leading our coverage of what promises to be the most wired election in history.

ON TWITTER: [@issielapowsky](https://twitter.com/issielapowsky)

ON THE WEB: [wired.com/tag/election-2016](http://wired.com/tag/election-2016)



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# THERE IS NO SUCH THING AS IMPOSSIBLE, IT'S JUST A MATTER OF FIGURING OUT HOW

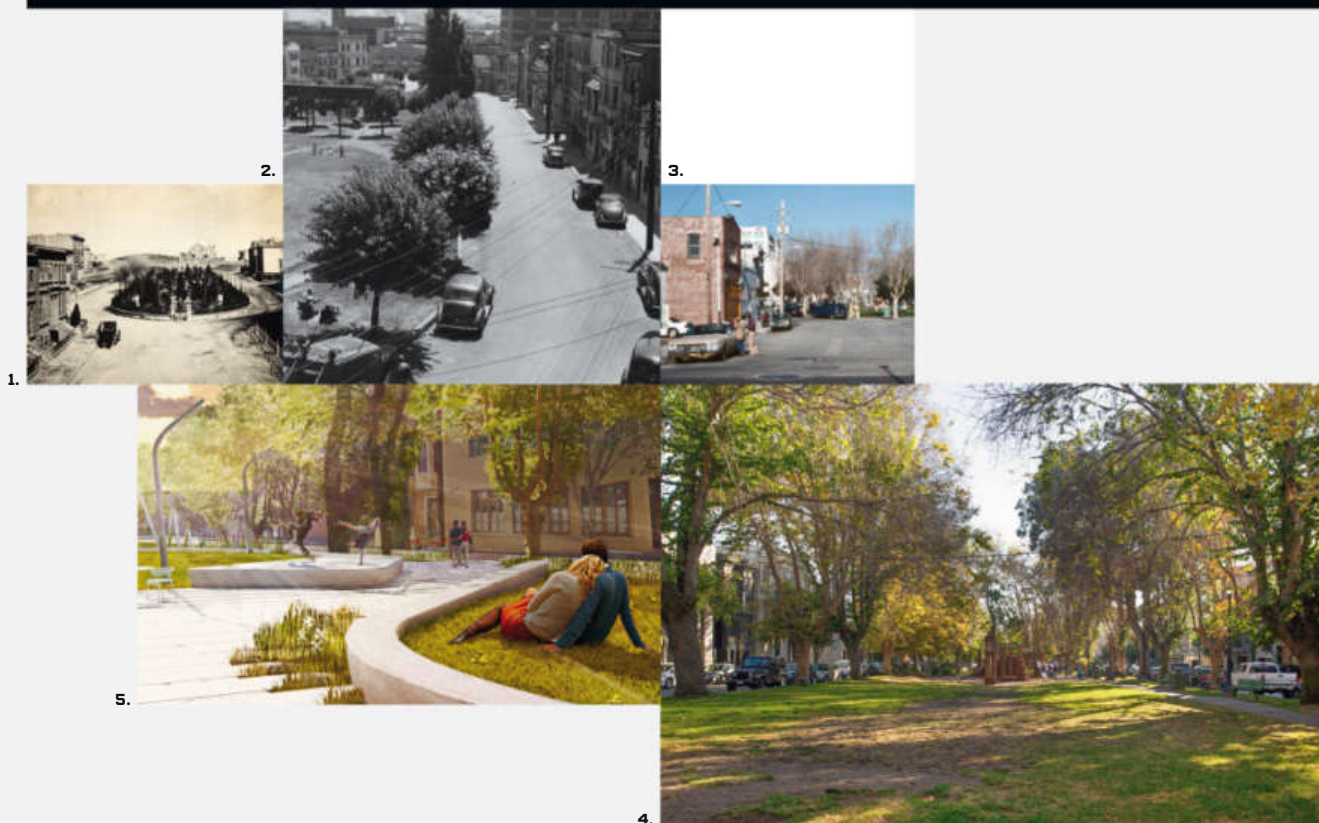
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AMAZING IN MOTION



Options shown. Prototype shown. ©2015 Lexus.



## A WALK IN THE PARK

From the moment I step out of my front door, it takes me about 10 minutes to get to work. Mine is a walking commute, a few short blocks across a sleepy stretch of San Francisco's SoMa neighborhood, and always involves a caffeine fueling at my favorite local coffee shop (double-shot large red eye, black). I love this stroll; I've been making some variation of it for much of the past decade I've been at WIRED. ¶ My favorite part of the route is the final block, which takes me through tree-lined South Park, one of the city's oldest and, I think, most charming public spaces. Sure, with its patchy grass and cracked walkways it's scruffy in places, but I love the green of the park and the way the trees describe the route through it. ¶ WIRED's first home was on the eastern edge of South Park, and as I pass it each morning I think about Louis Rossetto and Jane Metcalfe, the magazine's founders. As I walk, I come across dozens of today's young founders and entrepreneurs, invariably with heads down, gazes fixed on mobile screens as they carve their paths to startups with silly spellings, vowels omitted. Twitter was started here, Instagram too. Sometimes I'll just stop for a moment, sit on a bench and watch it all go by—the motion and change layering on top of the stable and the constant. (As a matter of fact, the park is about to get a \$3.5 million makeover.) This is the eternal push and pull of city life. ¶ Sometimes it's easy to stop seeing this change. But it comes to all parts of all cities, whether we like it or not. Every day, people make decisions—*design* decisions—that shape our habitats and neighborhoods, from civic architecture to the fluid dynamics of pedes-

trian traffic to policing policy. Sometimes these decisions are small, sometimes they are profound, but they always add up.

That's how design thinking works: One person adding to the decision-making of another. These changes aren't always deliberate (or deliberately for good, for that matter), but like time, the movement is constant. I don't see South Park change from day to day, but it is always reinventing itself.

This issue of WIRED is about holding a lens up to that cycle, about highlighting some of the most exhilarating and thoughtful design projects on the planet, from Bjarke Ingels' thrilling plans for Lower Manhattan to a crowd-mapped bus system in Nairobi. Designers are the people making these moments of human progress possible. They shape and actualize the promise of great cities. I doubt the designers of South Park had a person like me in mind when they drew up this small urban respite in 1854, but I'm glad they made the choices they did.



*Scott*

SCOTT DADICH  
Editor in Chief

Twitter Instagram @SDADICH





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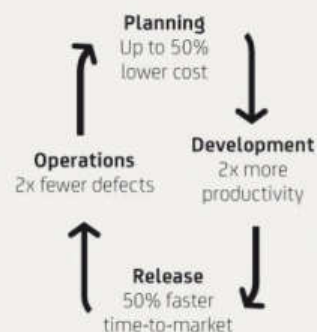
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## SOURCE CODE

Crispr stands for “clustered regularly interspaced short palindromic repeats.” Translation: an elegant new DNA-editing technique that will change life as we know it. As Amy Maxmen reported in our August cover story (“The Genesis Engine”), Crispr has already been used by scientists to reverse mutations that cause blindness, stop cancer cells from multiplying, and make cells impervious to the virus that causes AIDS. It’s a discovery that opens up a new world of ethical questions, not to mention inevitable patent fights over who owns the tech. Buckle up, people: This technology could change the world—if it doesn’t destroy it first.

RE: “THE GENESIS ENGINE”

**“FEELS LIKE THIS IS EITHER THE BEGINNING OR THE END OF OUR SPECIES.”**

Eric Johnson (@emjohnson17) on Twitter



“This is bigger than the invention of mechanical engineering or atomic power, and the ramifications, both positive and negative, are fascinating. We are becoming the gods the ancients talked about. Hope the sun doesn’t burp before things get really interesting.”

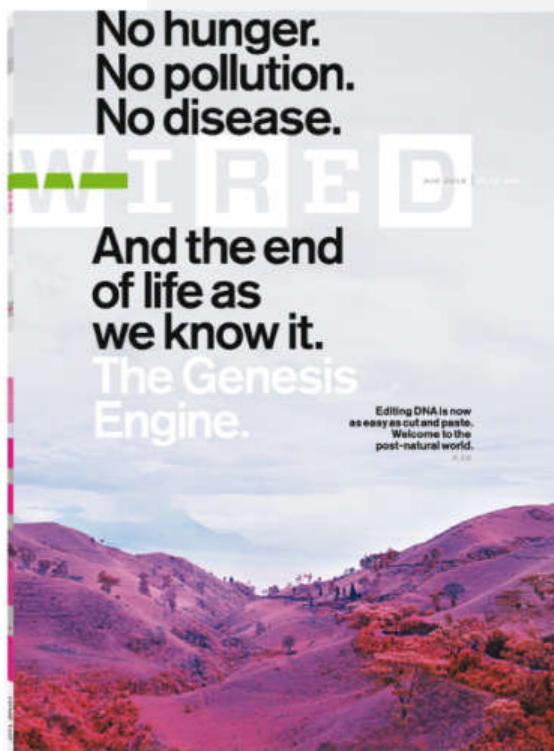
Dewreck on WIRED.com

“That was a fantastic article, but all I can think about now is spiders with wings.”

Tony Pepperoni on WIRED.com

“Biologist here. I work in a lab that uses Crispr to edit genes in a small invertebrate, *C. elegans*, for study purposes. All the doomsday hand-wringing is dramatically overstated. Crispr is a very powerful tool, and all tools carry some possibility of misuse. But Crispr isn’t going to start churning out designer babies or super-pathogens any time in the near future. There’s a lot still to learn. Just because you can accomplish something in cell culture doesn’t make it possible in a whole organism, especially one as complex as a human.”

Kalen on WIRED.com



RE: “A TOUCH OF DUPLASS”: HOW BROTHERS JAY AND MARK CAME TO RULE HOLLYWOOD

“Very cool to see the Hollywood production model being turned on its head by independents.”

Colin O'Hara (@colin pohara) on Twitter

“If you are like me, this strong WIRED profile will leave you admiring the

Duplass bros—and craving a doughnut.”

Lacey Rose (@lacey vrose) on Twitter

RE: “SOS, INC.”: DISASTER RESCUE BUSINESSES SAVE LIVES—FOR A FEE

“These two companies sound pretty awesome. Like for-profit superheroes.”

Isaacium on WIRED.com

“The resources Global Rescue used after the Nepal earthquake were private to begin with; GR merely took a helicopter when the government didn’t need it. Plus GR helped non-customers to the degree possible. I’m sure it’s a heart-breaking experience no matter how you paint it.”

F. Y. Jones on WIRED.com





# TRAVEL LIKE A PRO



Everyone has different reasons for traveling—for work, for play, or for a bit of both—but regardless of why you go away, there are ways to do it better. The Adventure Capitalist, Digital Gentleman, and IT Girl weigh in with their suggestions for getting the most out of your travels with clever hacks, essential gear, and the Marriott Rewards® Premier Credit Card from Chase.

## TURN THE PAGE FOR PRO TIPS

from the WIRED Insiders to see which travel style fits yours.

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Multitask with a Victorinox Swiss Army Knife packed with 12 useful tools like a bottle opener (great for local craft brews) and a toothpick (handy for street food).
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Save space with the minimal design of Bluebuds X by Jaybird offering eight-hour battery life on a single charge—just enough for a long flight or train ride.
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Update your photo stream with the sharp-shooting 16MP Polaroid iS085 Dual-Screen Waterproof Digital Camera, featuring front and rear LCD screens.

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- ☐ **Personal Charger**  
Stay well-rested with a Remee sleep mask designed to help increase the frequency of your lucid dreams with low-profile electronics and customizable light patterns.
- ☐ **Oversize Sketchbook**  
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RE: "SECRET WEAPON":  
ANDY GREENBERG BUILDS  
A GUN AT THE OFFICE

"I'm a 68-year-old a self-employed antique firearms restoration artist. So I was especially interested in the Ghost Gunner machine—not because of its ability to make an AR-15 receiver, but because it could have exciting possibilities for my restoration business. I frequently need to make small parts, and the machine has that ability. I don't work on modern guns and frankly dislike them—had enough in the Army. But the Old West and those weapons hold a special place in our heritage."

Dave Lanara via email

"This country's gun control debate would be much more civil if people adopted this article's objective attitude."  
Euroranger on WIRED.com

"It's a sad commentary on our species that we are smart enough to invent 3-D printers and computer-controlled milling machines but then use these devices to make guns for killing each other. I'm sure the cockroach archaeologists of the 50th century will look at all we did and wonder what the hell happened. Perhaps their summation will be 'They made a lot of plastic, then they all died.'"

Paul Griffin via email

RE: MR. KNOW-IT-ALL ON  
SWEARING AT WORK

"As a high school English teacher, I try to encourage my students to find more effective ways to communicate, and I recommend that they save the swearing for those times of pain and frustration that only a shout of 'f@ck!' can relieve. My advice: Ignore the coworkers' juvenile language skills and enjoy knowing that refraining from constantly swearing makes the world a more civil place."

Wendy Dotan via email

RE: "NO MORE SPIES LIKE US":  
ANGRY NERD WANTS MORE  
MOVIES LIKE *THE MAN FROM*  
*U.N.C.L.E.*

"I am similarly eager for this. I'm a sucker for period pieces, and a spy movie set during the heyday of spy movies is something I must see. And you're not wrong about the way the spy movie genre has been developing. James Bond has gotten less and less James Bond-y with each iteration."

Jim on WIRED.com

RE: "THE BEAUTIFUL DIVERSITY OF  
AUTISM": STEVE SILBERMAN'S NEW  
BOOK, *NEUOTRIBES*

"Awesome article. One comment, though: While many autistic people are highly intelligent, many have the misfortune of having their autism combined with other developmental disorders. Hollywood has created the myth of the prevalent autistic savant, but this is the exception, not the rule."

Ericflores on WIRED.com

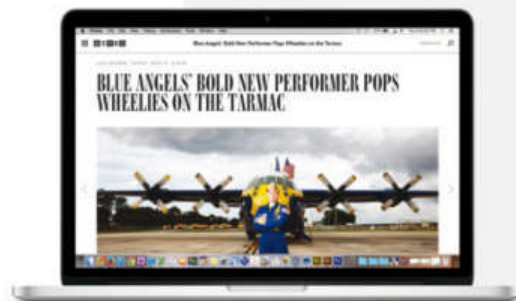
RE: "FEARLESS FLIER": MEET  
THE FIRST WOMAN TO  
FLY WITH THE BLUE ANGELS  
AEROBATICS SQUADRON

"Female pilots on our crew have mixed feelings about women pilots being news. On one hand, it's a shame that the issue is still considered 'news,' but on the other, it's amazing that little girls still don't know that certain professions even exist for them. Only 6 percent of pilots are female, and even fewer fly helicopters. We say 'give a girl a lift' by sharing this article with her."

Monumental Heli on WIRED.com

"Go get 'em, girl!"

Mark on WIRED.com



UNDO: The contents of *Science* go online Thursday afternoons, not Wednesday ("The Genesis Engine," issue 23.08). Lorna Wing did not discover Hans Asperger in a paper by Leo Kanner ("The Beautiful Diversity of Autism," issue 23.08).



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ARGUMENT

# FAMILY TIES

## YOUR RELATIVES' DNA COULD TURN YOU INTO A SUSPECT

BY BRENDAN I. KOERNER



ALPHA

T

**THE THREE MEN** who showed up at Michael Usry's door last December were unfailingly polite. They told him they were cops investigating a hit-and-run that had occurred a few blocks away, near New Orleans City Park, and they invited Usry to accompany them to a police station so he could answer some questions. Certain that he hadn't committed any crime, the 36-year-old filmmaker agreed to make the trip. ¶ The situation got weird in the car. As they drove, the cops prodded Usry for details of a 1998 trip he'd taken to Rexburg, Idaho, where two of his sisters later attended college—a detail they'd





gleaned by studying his Facebook page. “They were like, ‘We know high school kids do some crazy things—were you drinking? Did you meet anybody?’” Usry recalls. The grilling continued downtown until one of the three men—an FBI agent—told Usry he wanted to swab the inside of Usry’s cheek but wouldn’t explain his reason for doing so, though he emphasized that their warrant meant Usry could not refuse.

The bewildered Usry soon learned that he was a suspect in the 1996 murder of an Idaho Falls teenager named Angie Dodge. Though a man had been convicted of that crime after giving an iffy confession, his DNA didn’t match what was found at the crime scene. Detectives had focused on Usry after running a familial DNA search, a technique that allows investigators to identify suspects who don’t have DNA in a law enforcement database but whose close relatives have had their genetic profiles cataloged. In Usry’s case the crime scene DNA bore numerous similarities to that of Usry’s father, who years earlier had donated a DNA sample to a genealogy project through his Mormon church in Mississippi. That project’s database was later purchased by Ancestry, which made it publicly searchable—a decision that didn’t take into account the possibility that cops might someday use it to hunt for genetic leads.

Usry, whose story was first reported in *The New Orleans Advocate*, was finally cleared after a nerve-racking 33-day wait—the DNA extracted from his cheek cells didn’t match that of Dodge’s killer, whom detectives still seek. But the fact that he fell under suspicion in the first place is the latest sign that it’s time to set ground rules for familial DNA searching, before misuse of the imperfect technology starts ruining lives.

Mitch Morrissey, Denver’s district attorney and one of the nation’s leading advocates for

## FAMILIAL DNA SEARCHING IS A SCATTERSHOT APPROACH THAT YIELDS FALSE LEADS.

familial DNA searching, stresses that the technology is “an innovative approach to investigating challenging cases, particularly cold cases where the victims are women or children and traditional investigative tactics fail to yield a solid suspect.” Familial DNA searches have indeed helped nab people who might otherwise have evaded justice. In the most celebrated example, Los Angeles police arrested a man believed to be the Grim Sleeper serial killer after discovering that the crime scene DNA shared a significant number of genetic markers with that of a convicted felon—who turned out to be the man’s son.

But the well-publicized success stories obscure the fact that familial DNA searches can gen-

erate more noise than signal. “Anyone who knows the science understands that there’s a high rate of false positives,” says Erin Murphy, a New York University law professor and the author of *Inside the Cell: The Dark Side of Forensic DNA*. The searches, after all, look for DNA profiles that are similar to the perpetrator’s but by no means identical, a scatter-shot approach that yields many fruitless leads, and for limited benefit. In the United Kingdom, a 2014 study found that just 17 percent of familial DNA searches “resulted in the identification of a relative of the true offender.”

The technology’s limitations have the potential to cause real harm: What if Michael Usry was not a filmmaker, for example, but rather a high school teacher whose alleged involvement in a girl’s murder was leaked to the media? Yet despite all that can go wrong, few states have developed guidelines. California, Colorado, Virginia, and Texas have detailed policies regarding how and when familial DNA searches can take place; Maryland and the District of Columbia explicitly forbid the technique. Elsewhere in the nation, cops are largely free to search as they see fit, which is why Idaho Falls police decided it was OK to sift through an Ancestry database of genetic data from thousands of people with no criminal records.

Familial DNA searching is only going to get more prevalent as the cost of rapid DNA analysis plummets and the size of genetic databases swells. States must start putting rules in place to protect citizens, beginning by prohibiting police from running searches through non-governmental databases, as happened in Usry’s case. This is not only because

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**Brendan I. Koerner**  
(@brendankoerner)  
is a contributing editor and author of *The Skies Belong to Us*.





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of privacy concerns—the people who contribute their DNA to such endeavors, whether medical or genealogical, rarely expect to have their genetic code scrutinized by cops—but also because those databases haven’t been vetted for use by law enforcement. Police in Idaho Falls, for example, were able to obtain a warrant for Usry’s cheek cells because his father’s DNA “matched 34 of 35 alleles” of that of Angie Dodge’s killer. But how common are those particular alleles in the general population? Does this even mean that there is a familial link? This isn’t entirely clear. (Ancestry, which gave Idaho Falls police the name of Usry’s father in response to a court order, has since shut down the database in question because, the company said, the “site [had] been used for purposes other than that [for] which it was intended.”)

States should also follow California’s lead by creating a layer of oversight that prevents cops from pursuing shaky matches. Before a police department in California can proceed with a familial DNA search, it must ask permission from a committee run by the state’s Department of Justice, which determines whether the crime in question was serious enough to merit the procedure. (Only homicides and sexual assaults have been considered.) Once approved, a search must yield a match that conforms to rigorous reliability criteria, including a test that verifies that the criminal and the person in the database share an identical Y chromosome. (Y chromosomes are passed intact from father to son.) According to a 2012 report, only about 10 percent of California’s searches return a match that warrants any investigative follow-up.

Even under the best of circumstances, widespread familial DNA searching will result in some innocents being compelled to offer DNA samples. When those people are exculpated, they deserve to reclaim their genetic privacy. “There should be an automatic expungement of both the sample and profile, without any affirmative action from the individual,” says Sonia Suter, a George Washington University Law School professor who has written about familial DNA searching. That requirement may seem like common sense, but it needs to be in writing. Genetic material is potentially valuable evidence, and law enforcement agencies are loath to relinquish it once they’ve acquired it; they cannot be trusted to destroy such evidence out of the kindness of their hearts.

Above all, states must be transparent about both the efficacy and the collateral damage of familial DNA searching: They should publish annual statistics regarding how many searches are conducted, what percentage of those result in convictions, and how many suspects are cleared after enduring a stressful period of suspicion. Only then can we get a sense of whether we’re catching enough Grim Sleepers to merit causing problems for a whole lot of Michael Usrys. **X**



KIDS

## ABRA- CODE-DABRA MAGICAL NEW CODING GAMES

Coding games aren’t exactly riveting. Sometimes you’re navigating a maze; other times you’re rearranging tiles. Wow, it sure looks nice outside! But the next generation of these games might just keep kids hooked—and learning. Take *CodeSpells*, a new PC game designed by computer scientists at UC San Diego. In it, you play as a wizard, commanding the four elements to alter an open-ended 3-D environment. Say you want to levitate that rock. The strength and properties of your spell depend on how you build it in the coding window. Beginners learn using a drag-and-drop language called Blockly, while more advanced users can tinker with the underlying JavaScript. Other new games, like *CodeCombat* and *Codemancer*, introduce similar concepts, recasting coding as a kind of sorcery. “It’s a great metaphor,” says Stephen Foster, one of *CodeSpells*’ creators. “These types of games are going to proliferate.” You can stop waiting for that Hogwarts letter now—programming will unlock your true powers. —EWEN HOSIE



SIX VISIONARIES POINT THEIR CAMERAS AT THE CUTTING EDGE OF SCIENCE

A GLOBAL SERIES EVENT

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ALPHA

MUSIC

# SECOND COMING CHVRCHES EYES A BRIGHT FUTURE

have gone to studio rentals and production fees instead went toward upgrading recording gear—and the result, *Every Open Eye*, cements the group as today's heir apparent to Depeche Mode, New Order, and other titans of British electronic music. ¶ While the first album was composed with three keyboards and a microphone, Chvrches more than quadrupled the instrumental arsenal for *Every Open Eye*. That diversity begot a record that feels current while still acknowledging the band's diverse influences. (It has covered both Bauhaus and Prince in concert.) From the cascading loops of "Never Ending Circles" to the synth walls of "Clearest Blue," it's a maelstrom of pop energy—and at its center is singer Lauren Mayberry, whose ability to fashion her ethereal voice into a soaring brute-force weapon makes her a modern-day Annie Lennox. ¶ But while its sound is bigger, Chvrches kept some things the same. "Martin always jokes that the first record is your footprint in the sand," Mayberry says about bandmate Martin Doherty, "and your second record has to hold true to those ideals." The band has recaptured and distilled the insane catchiness of its debut—and this time, even more people are bound to hear its call to worship. —K. M. MCFARLAND

WHEN IT CAME TIME for Chvrches to record the follow-up to its acclaimed 2013 debut, *The Bones of What You Believe*, conventional wisdom dictated that the Scottish synth-pop group would go big. But while other bands might have sought a legendary producer or studio for their sophomore release, Chvrches returned to the converted Glasgow flat where it had recorded *The Bones*. Every dollar that would

The electro-pop trio (from left: Martin Doherty, Lauren Mayberry, and Iain Cook) brings a DIY fierceness to its high-shine music.

# 364

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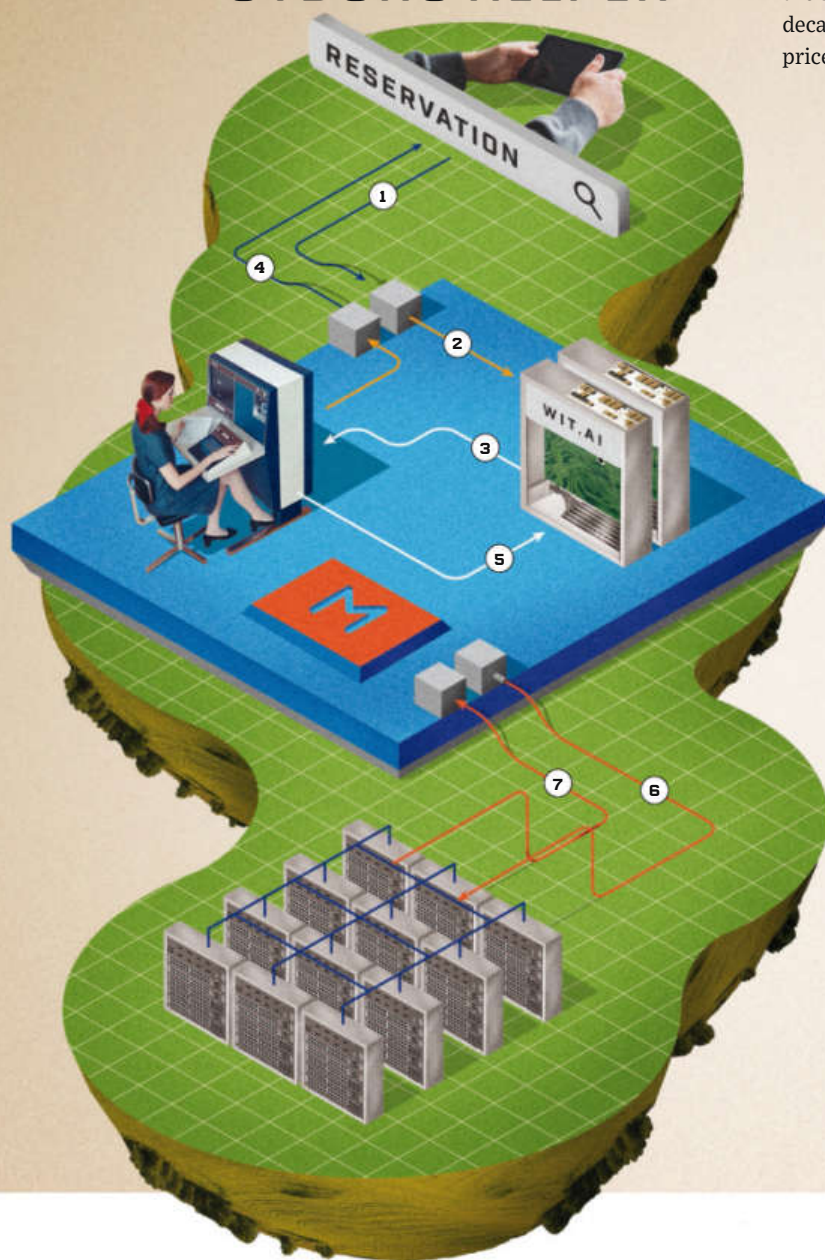
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# TEXT M FOR ASSISTANCE FACEBOOK'S NEW CYBORG HELPER



**M WILL TELL YOU** a good joke. It'll schedule your driving test. It'll even plan your next vacation. It's like Siri—except it doesn't suck. The trick is that M, a new digital assistant that Facebook is rolling out this fall, is backed not only by artificial intelligence but also real live humans who can, say, dial up the DMV and sit on hold for an hour. That may seem like cheating—it might even seem downright nuts when you consider that M is free and Facebook has to pay all those humans an hourly wage. But Facebook is playing the long game. The M system will be closely tracking everything those human assistants do so that it can ultimately teach complex neural networks—brainlike computing systems—to perform the same tasks unassisted. This may take years. Even decades. In the meantime, you get two assistants for the price of none. —CADE METZ

## How M Watches and Learns

1. You Facebook-message M with a request: "Make me a restaurant reservation!" or "Buy my friend a birthday present!"
2. Using simple artificial intelligence from Wit.ai, a company Facebook acquired this year, M generates a response as best it can.
3. M sends this response to human operators at Facebook—not to you—and the humans decide whether it's sufficient.
4. If the human approves the response, they execute the request for you (for now). If not, the human corrects the AI or asks you for additional info.
5. M tracks all the behavior of the human operators, including what websites they visit, what phone calls they make, and what they say. M feeds this back into the Wit.ai system, improving it over time.
6. Eventually, Facebook will start feeding the collected data into a deep-learning neural network, a vast array of machines that mimics the web of neurons in the human brain. Today a neural net can, say, learn to identify photos. Using data from M, it can learn to perform far more complex tasks, like planning a vacation.
7. The process repeats ad infinitum—presumably until M achieves the Singularity.



ISRAEL VARGAS

**DATASTREAM // ON HALLOWEEN, PERCENT OF PEOPLE WHO ...**

HAND OUT CANDY: 75 // LET TRICK-OR-TREATERS CHOOSE THEIR CANDY: 51 // REWARD CUTE COSTUMES WITH MORE CANDY: 40 // DRESS UP FOR TRICK-OR-TREATERS: 27 // DRESS UP THEIR PETS: 13 // MONITOR KIDS' CANDY CONSUMPTION IN SOME WAY: 78 // STEAL CANDY FROM THEIR KIDS: 78





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ALPHA

SPACE

**ThumbSat Stats****Main module area:** 3.6 in<sup>2</sup>**Total length:** 16 inches**Cost (including launch):** \$15,000

# THUMBS WAY UP AN ITTY-BITTY SATELLITE BRIGADE

**IT LOOKS LIKE AN ALIEN BALLOON.** Except that it flies at 17,500 mph in near-Earth orbit and can carry a science experiment—potentially *your* science experiment—for two months before it burns up in the atmosphere. And early next year, 20 of these ThumbSats will beam data back to a network of 50 listening stations all over the world. ¶ Aerospace engineer Shaun Whitehead came up with the ThumbSat project because he wanted to help regular people send stuff into space. “We get slowed down by old-school ways of thinking,” he says. “I hope that ThumbSat accelerates progress in space, inspires everyone to look up.” His craft are so small that they fit into the nooks and crannies of commercial launchers, hitching a ride with bigger payloads and keeping costs down. ¶ The people conducting the first experiments are a diverse group. Engineers at the NASA Jet Propulsion Laboratory hope to use a cluster of connected ThumbSats to study gravitational waves. Three teenage sisters from Tennessee who go by the moniker Chicks in Space want to orbit algae and sea monkey eggs. Artist Stefan G. Bucher will deploy magnetized fluids and shape-memory alloys. ¶ Eventually a global network of volunteers, including a Boy Scout group in Wisconsin and a school in the Cook Islands, will monitor all the ThumbSat data. (Without receivers on those remote islands, there’d be a big gap in coverage out in the South Pacific.) Space is the place, and pretty soon anyone will be able to reach it. —JON LACKMAN

This optional vane adds stability and makes the sat more visible to radar.

Shape-memory alloy tail/antenna

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GPS

Transmitter

Experiment goes in here  
Battery

Microcontroller

“Selfie” micro camera





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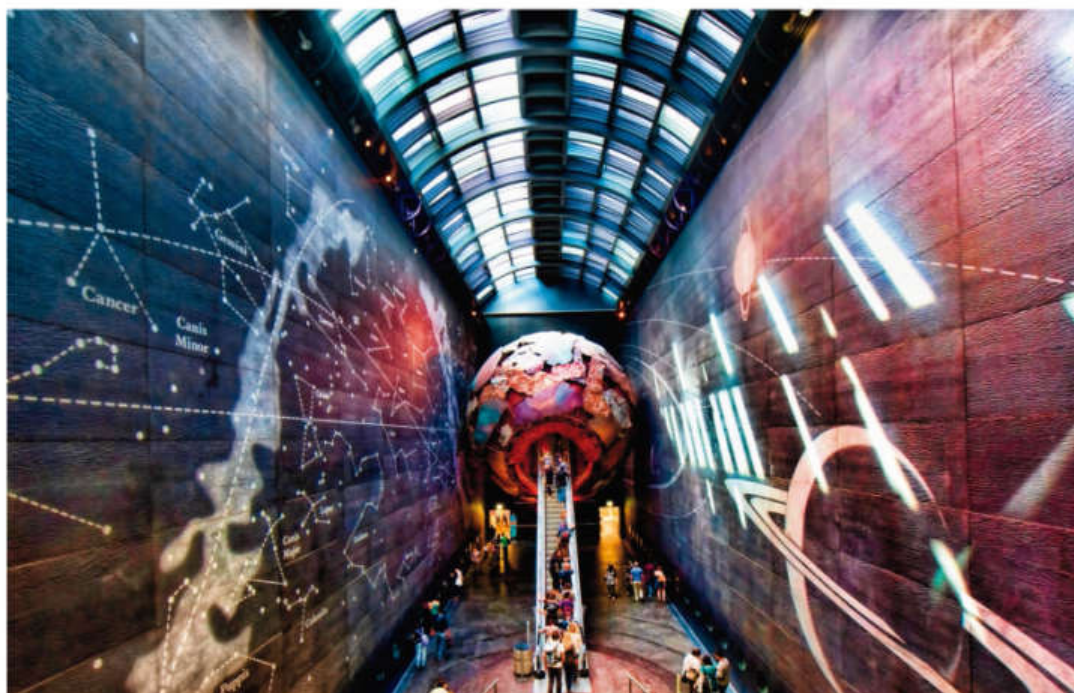
LEGENDARY SWISS WATCHES SINCE 1853



THE TUNNEL FOR THE NEW CROSSRAIL RAILWAY PROJECT PASSES BETWEEN EXISTING STRUCTURES AT ONE TUBE STATION WITH LESS THAN 3 FEET OF CLEARANCE. // THE LONDON EYE HAS COMPLETED ENOUGH REVOLUTIONS TO HAVE TRAVELED 32,932 MILES. // WEMBLEY STADIUM SEATS 90,000 SCREAMING FOOTBALL FANS.

## WIRED CITIES

# LONDON CALLING CRIME SCENES AND ICE WALLS



At the Natural History Museum, you can journey into a giant metallic globe and see a piece of moon rock.

## Do

Channel your inner White Walker at the **Vertical Chill**, a two-story indoor ice-climbing wall in Covent Garden. Board a speedy rigid inflatable boat—a favorite of militaries and police forces the world over—to visit the 33,000-ton **Thames Barrier**, which reaches 1,700 feet across the river. Head to **Bletchley Park**, where Alan Turing and others worked in code-breaking huts to tap into messages scrambled by the Nazi's infamous Enigma machine.



## Eat

Sip crazy cocktails like the **Prairie Oyster** (tomato yolk, horse-radish vodka, celery salt, and micro herbs) at **69 Colebrooke Row**. At the **Perfectionists' Café** in Heathrow, fish and chips comes with a spray atomizer of pickled onion vinegar; sun-dae comes with a mister of fruit brandy. **St. John** is all about nose-to-tail eating, with everything from pigs' ears to marrow to—for those who prefer their tails fluffy—squirrel.



"I like to sit and chat with my mum at the Haberdashery in Crouch End, North London. We drink tea and eat homemade cakes, surrounded by new mothers with sleeping babies in strollers."

—Platon, renowned photographer and WIRED contributor

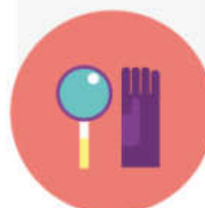
**LONDON HAS AMAZING** museums, a burgeoning microbrewery scene, and some bloody good ghost stories. But one of the most rousing reasons to visit is, as they say over here, sport. In October, the three-time Olympic host city will be home to the Rugby World Cup, an event that will bring together teams from 20 countries. Join the scrum of 2.4 million ticket holders and find out what a hooker really does. And don't worry about feeling homesick. American football teams (as in *football* football, not low-scoring, penalty-card-brandishing, injury-faking Euro-soccer-football) will be in town to play some games at Wembley Stadium. —ELISE CRAIG



## See

Hitchhikers of the universe, visit **Douglas Adams' grave** (and maybe lay a ball-point pen there) in Highgate Cemetery. Catch the European premiere of **Steve Jobs** at the London Film Festival on October 18. Tour **Churchill's war rooms**, the bunker where he and

his cabinet worked during the Blitz. The telephone room had a line straight to Roosevelt's White House. At the **Museum of London** you can inspect crime scene clues, from forgery tools to gloves used in murder cases, now on display for the general public for the first time.





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ADVERTISEMENT FEATURE

THE GLOBAL ALLIANCE FOR CLEAN COOKSTOVES, AND ITS GLOBAL PARTNER BASE, IS WORKING TO INCREASE ENERGY ACCESS AND SAVE MILLIONS OF LIVES BY UPDATING A UBIQUITOUS TECHNOLOGY: THE TRADITIONAL STOVE

# HOW TO FIX A BURNING ISSUE

We all need to eat. But what if home cooking endangered your family's health every day? That's the case for almost half the population of the planet.

"Globally, three billion people rely on solid fuels to cook, causing serious environmental and health impacts that disproportionately affect women and children," says Radha Muthiah, CEO of the Global Alliance for Clean Cookstoves. "According to the World Health Organization, household air pollution from cooking kills over four million people every year – and sickens millions more."

To tackle this vast challenge, the Alliance was launched in 2010 by the United Nations Foundation, the US State Department and Shell – along with 16 other partners. The Alliance's public-private partnership model aims to achieve large-scale behavior change by creating a market for clean cookstoves and fuels and enabling 100 million households to adopt clean and efficient cooking stoves and fuels by 2020.

"We're stimulating demand through awareness building and behavior change, and strengthening supply by developing a pipeline of businesses to supply products," says Muthiah, based in Washington DC.

One such business is New York City startup BioLite. Founders Alec Drummond and Jonathan Cedar created the HomeStove, which, with its thermoelectric generator, turns waste heat from the fire into electricity – this powers an integrated

fan, enabling an efficient burn and a smoke reduction of up to 90 per cent.

This elegant solution not only created the energy to power clean, efficient combustion, but it also produced extra electricity – enough to charge a phone or power lights.

BioLite pioneers a new business model called "parallel innovation", in which it designs products with the same core technology for both emerging and established markets – reinvesting revenue from outdoor recreation sales into the emerging markets business, until self-sufficient. Globally, BioLite has since enabled clean cooking and charging in more than 70 countries. And the co-generated electricity has helped engage husbands in the stove purchase alongside their wives.

The initiation of the Alliance in 2010 coincided with Shell's identification of access to energy as a key social investment theme. Shell's involvement in the Alliance built on the long-standing work of Shell Foundation, an independent charity that helped to pioneer the clean cookstove sector.

"What we'd learnt at Shell was that producing energy doesn't always result in universal access to it," says Anna van



Remundt, social performance advisor, access to energy at Shell. "There is no one-size-fits-all solution to energy access. Instead, we need tailored solutions driven by local markets, needs and opportunities. This requires effective collaboration between governments, businesses and others."

The partnership between Shell and the Alliance combines Shell's financial pledge of \$12 million with in-kind support through participation on the Alliance's Advisory Council, a secondee, and the provision of technical and business skills to assist the Alliance in its goals.

Jennifer Tweddell, Shell's secondee, has helped develop three catalytic enterprise development grant programmes – including the Spark Fund. The Alliance reports that it has attracted over \$50 million in grant funding and over \$58 million

**"THERE IS NO ONE-SIZE-FITS-ALL SOLUTION TO ENERGY ACCESS... WE NEED TAILORED SOLUTIONS"**





**BioLite HomeStove's disruptive technology offers clean cooking and off-grid electricity to charge mobile phones and LED lights. Here it is in use in Uganda**



In partnership with Impact Carbon, BioLite was part of the first round of beneficiaries in a cohort that included EzyLife Kenya, which provides efficient cookstoves, as well as solar lighting and water purification systems. In 2013, the Alliance awarded Spark grants to six more enterprises, including Greenway Appliances, an Indian-based company with sales of more than 250,000 cookstoves.

The partnership between the Alliance and Shell, and their collaboration on the Spark Fund, have impacted the health of millions, but have also provided climate and gender empowerment benefits. For example, black carbon, which results from incomplete combustion of solid fuel, is estimated to contribute the equivalent of up to 50 per cent of carbon dioxide warming globally, and residential solid fuel burning accounts for up to 25 per cent of black carbon emissions.

"Cooking is a gender issue," says Anna van Remundt. "Women and girls are most affected and, in some regions, spend up to five hours a day gathering wood, or allocate up to a third of their household income on fuel. Using an improved cookstove frees up to 60 days a year for women, and increases in efficiency could equate to enough savings to send two children to school."

But the job is not yet done. According to Radha Muthiah, while the Alliance has made strong progress in developing the sector over the past five years and is on target to reach its mid-term and long-term goals – that of getting cleaner cookstoves into 60 million homes by 2017 and ultimately 100 million homes by 2020 – much work is still needed to tap the full benefit of clean cooking for the wellbeing of the world's population.

"If we get this right," says Cedar, of his BioLite technology and others. "We could see the same kind of global health impact as penicillin." **See #makethefuture**

in new investments to the sector since it was launched in 2010.

The Spark Fund, developed by the Alliance in 2012, is a grant facility designed to mirror early stage investment. With a pool of \$1-2 million a year, of which \$1 million is funded by Shell, Spark aims to help enterprises working in the household cooking sector reach commercial viability and scale.

The Alliance leverages Shell's commitment to the Spark Fund with support from multilateral and bilateral donors such as the Climate and Clean Air Coalition, Germany's Federal Ministry for Economic Cooperation and Development, and Sweden's Ministry of Foreign Affairs. During each round of the Alliance's Spark Fund, four to six enterprises receive financial support.

## BIOLITE HOMESTOVE - HOW IT WORKS

BioLite founders Alec Drummond and Jonathan Cedar designed the HomeStove to be simple to operate

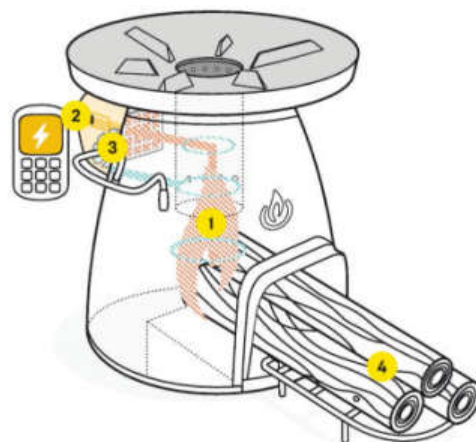


**1. Light the HomeStove**  
To get the stove burning, users feed local fuels – whether wood, cow dung or crop residue – through the side of the stove. Then they light the fire any way they normally would.

**2. Power up the in-built fan**  
Excess heat from the flame is converted into electricity through a thermoelectric generator. This powers the internal fan and the USB port, for phone charging or LED lighting.

**3. Utilise the power of oxygen**  
The internal fan force-feeds oxygen into the flame, eliminating smoke, and leading to near complete and clean combustion of the solid fuel. The fuel now burns almost as cleanly as gas.

**4. Re-fill with fuel as necessary**  
All the user needs to do to keep the feedback loop going is keep the HomeStove supplied with a viable biomass fuel. This results in an almost limitless energy solution.







**CAME OVER**  
(FOREVER.)

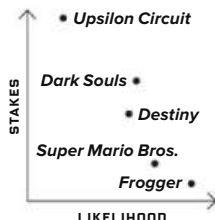


ALPHA

WRONG THEORY

# DEATH, ACTUALLY ONE IN-GAME LIFE TO LIVE

## Dying in Videogames



In videogames, death is rarely fatal. If you take a shotgun blast to the noggin, a simple restart gets you back in the action. That's what makes the twist behind the upcoming PC game *Upsilon Circuit* so scary: If you die in this world, you're done. Nope, can't even start over. You can never play again. ¶ The goal of indie game studio Robot Loves Kitty

is to see how players behave when any misstep could mean the permanent end of their existence. (They're calling it perma-permadeath.) The setup: Two teams of four meet in a fantasy arena, where monsters and traps threaten at every turn. "What I'm hoping happens is that the experience evolves," codeveloper Calvin Goble says, "and that the people who live longest will respect their one life, be more cautious and careful." ¶ Yes, only

eight people play at a time, but a vast audience of spectators can stream the game live—plus they're empowered to toss aid or obstacles to the all-too-mortal players. In the event of a perma-permadeath, a random viewer becomes the next player, like a contestant on *The Price Is Right* summoned up from the crowd. "The only way we can go a step up from this is if we actually start killing the contestants in real life," Goble says. OK, now you're really freaking us out. —CHRIS BAKER

ANGRY NERD

## EASY ON THE REUNION SHOWS!

Gimme some long-delayed sugar, baby: Sam Raimi's *Evil Dead* franchise is getting a TV reboot! Then again, so is *Twin Peaks* ... and *The Muppets*, *The X-Files*, and other series that I used to treasure way back in the VHS era. I know I should be elated; this is what we fought for, after all. So why do I feel like a mouse noticing that this fragrant hunk of Camembert is stuck to a very gnarly-looking trap? People, we've been here before, and returns to decades-old franchises almost always disappoint—especially on TV. Remember the last cycle of reunions? *Still the Beaver*, *Return to Green Acres*, *Bring Me the Head of Dobie Gillis*, and *The Harlem Globetrotters on Gilligan's Island*. (OK, so maybe that last one is a classic.) Look, I'm going to watch *Ash vs. Evil Dead*, just as I watch anything made by Saint Raimi and the Holy Bruce. But this thing threatens to be a cultural *Necronomicon*—and if we're going to avoid a plague of undead franchises shambling through the streets, we'll need a weapon. That's why I'm proposing a Ban on Old, Musty Shows Television Introduces Campily/Kitschily. This is my BOOMSTICK! Used properly, it should let us minimize the number of Deadites. Wait, what's that you say? There's also going to be a new version of *Full House*? Sweet merciful Cthulhu, it's already worse than I ever could have imagined. KLAATU BARADA NIKTO! KLAATU BARADA NIKTO!



COURTESY OF ROBOT LOVES KITTY; ILLUSTRATION BY ZOHAR LAZAR



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## TOOL

# EYES ON THE FUTURE

## JAUNT'S SLEEK NEW VR MOVIE CAMERA

We may still be in the predawn hours of the virtual-reality age—consumer headsets from Oculus, Sony, and HTC are coming within months—but after more than two years in development, the Jaunt Neo camera is here to help filmmakers create the virtual movies of their nonvirtual dreams. Till

now, capturing 360-degree 3-D video has meant rigging together an array of GoPro or Red cameras; the Neo packs 24 custom-built lenses. More important, it does away with the painstaking postproduction that bogs down most VR shoots. Synchronized cameras and Jaunt's algorithm allow for an all-encompassing image with no visible stitching. Don't bother getting out your credit card, though. The company is making the Neo available only to its "creative partners"—which, once contracts dry, means some of Hollywood's top directors. It's clear that the revolution won't just be televised. It'll be fully immersive. —PETER RUBIN



Each of the Neo's 24 lenses has a sensor four times larger than that of a GoPro Hero4.



# JUST ASK

*Add gelato to  
my shopping list.*

*How is traffic?*

*What's on my  
calendar today?*

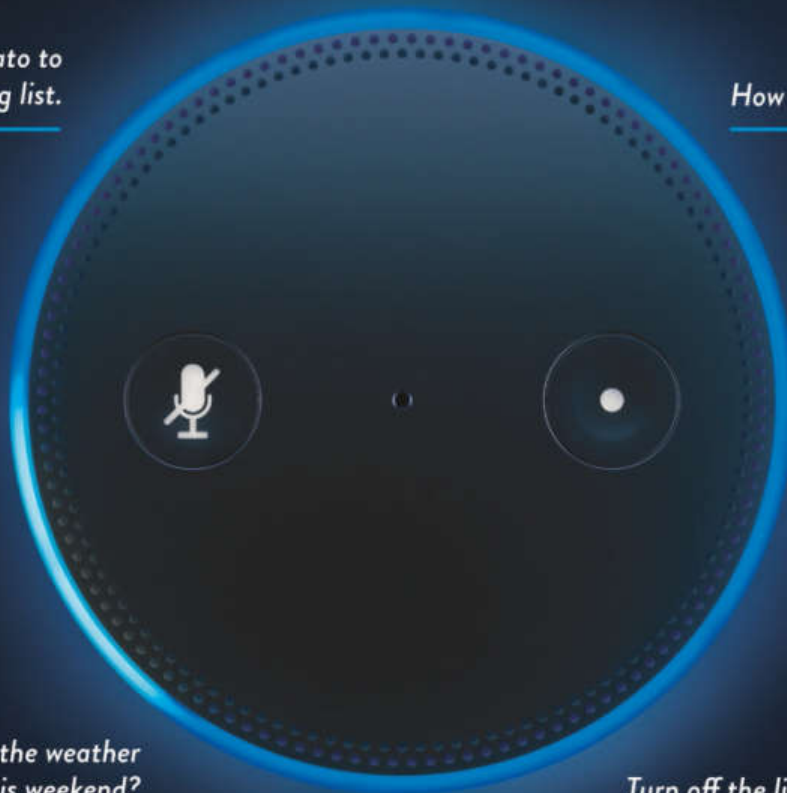
*Set a timer  
for 3 minutes.*

*Play my "New  
Artists" Playlist.*

*What's the  
news today?*

*What's the weather  
like this weekend?*

*Turn off the lights.*



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## FIRST TO MARKET DELIVERIES

One-hour delivery service Kozmo.com may have flamed out back in 2001, but thanks in part to smartphones' tracking capabilities, same-day deliveries are seeing a renaissance. Some new services can even make drop-offs to people who don't provide a proper address. Here are three outfits that big-moneyed VCs are betting will deliver the goods. —VICTORIA TANG

### Postmates



**\$80 million raised**  
in a Series C round  
(June 2015)

While Postmates will cart around just about anything, they're best known for food delivery coordinated by a nifty logistics platform. Plus, they'll even relay your high-maintenance requests for dietary substitutions.

### Fetchr



**\$11 million raised**  
in a Series A round  
(June 2015)

The couriers for this service (currently only available in the United Arab Emirates) track recipients using their phone's GPS coordinates, which means they can ferry things about in areas where people give directions using landmarks (turn left at the fruit stand).

### Dropoff



**\$7 million raised**  
in a Series A round  
(June 2015)

Anxious attorneys can confirm that their filings made the court deadline with this Texas business courier's live map updates. Multi-tasking lawyers (and other worker-types) can even summon couriers to their restaurant table when they're out power lunching.



ALPHA

FANDOM

## A GOOD LONG SPELL WAITING FOR FANTASY NOVELISTS

**GEORGE R. R. MARTIN** has a new book coming out in October! Just one problem: It's not the next *Game of Thrones* novel. Since the fifth title in his planned seven-parter was published in 2011, Martin has been prolific—with everything but book six. Graphic novels. Sci-fi anthologies. Something called *The Wit & Wisdom of Tyrion Lannister*. Meanwhile, the HBO show has caught up to the books and is beginning to overtake them. ¶ Not surprisingly, this behavior is spreading. Consider Patrick Rothfuss, whose debut trilogy, *The Kingkiller Chronicle*, has suffered *questus interruptus* for four years. Fans are annoyed, but on a panel at last year's New York Comic Con, Rothfuss reasoned that Martin “paved the way for authors who take a little bit longer.” ¶ But what if this is a good thing? For as long as fantasy has been a genre, academics and critics have dismissed it as subliterate. We're fueling the problem by expecting our authors to produce at a rate that privileges quantity over quality. Stand-alone novels have been replaced by megaseries, and binge-happy readers are always looking for their next fix. If fantasy is to be regarded as real literature, we need to let its finest practitioners take as much time as they need. Only then will they mother the most powerful dragons. —JASON KEHE







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ALPHA

## WHAT'S INSIDE

# SILLY STRING

## THE SECRET'S IN THE SOLVENT

**Surfactant**

Despite its name, the maker of Silly String is very serious about keeping the recipe under wraps. Originally sold by Wham-O, the trademark was acquired by the Car-Freshner Corporation in 2001. The secret is in its solvent and surfactant, neither of which the company will name—along with other stuff it won't confirm. Surfactant is just a fancy name for detergent, which is amphiphilic—both hydrophobic (water-repelling) and hydrophilic (water-attracting). That attraction-repulsion combination helps bind molecules in the solution so the string comes out in one solid, silly stream. The stickiness also helps the stuff cling to surfaces—and people.

**Deionized Water, Solvent**

Shaking the can mixes the solvent—that-shall-not-be-named with the rest of the ingredients, forming a temporary blend of plastics, minerals, and propellants. Both the water and the solvent quickly evaporate outside the can, leaving the foamy solids behind.

**1,1,1,2-Tetrafluoroethane**

The aerosol powerhouse that sends the mixture flying is a relative of Freon-12, the ozone-depleting refrigerant that pressurized first-gen Silly String back in 1972. Inside the can, this propellant is in a compressed liquid form; when you hit the nozzle to slime your enemies, the pressure drop causes the liquid to boil and vaporize, expanding and pushing the goo out of the can.

**Polyacrylic Resin**

The string gets its structure from this material—a durable polymerized plastic. Mixed into the can as a powder during manufacturing, it creates a viscous solution. But once the plastic is propelled into the air, it forms a sturdy exoskeleton. The shell will stay in place for weeks if you never quite get around to tying up the loose ends of your Fright Night extravaganza.

**Talc**

Without talc, the string would be all plastic skin and no body, like a joke that falls flat. Made up of mostly magnesium, silicon, and oxygen, this absorbent mineral provides the resin with substance, filling out the string as it expands to the size of the hole in the can's nozzle.

**Isopropyl Alcohol, Ammonia**

These two ingredients help keep the solution stable so it can last between Halloweens. The alcohol prevents bugs from growing inside the container. The ammonia—or other basic compound—raises the pH just enough so the can's metal interior won't corrode. After all, nothing is less silly than rusty Silly String. —KATIE M. PALMER



sip  
sign  
green-light



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up  
up  
up





# F IS FOR FAKE COUNTERFEIT EVERYTHING

THAT VINYL “LOUIS VUITTON” wallet you bought on Canal Street is vexing to the real Louis Vuitton (and it makes you look like a tool). But counterfeits are also a \$650 billion pillar of world trade—and some of these are knockoffs of things that actually matter. “Aircraft components have a lot of counterfeit parts,” says Tom Grace, who works on anti-counterfeiting at equipment manufacturer Eaton. Worse, the fakes often fool legitimate companies into purchasing them. Experts walked us through some recent examples. —MATT JANCER

## Sketchy Parts in Nuclear Plants

In May 2013 the Korea Institute of Nuclear Safety shut down three power plants when investigators found that control cables used to signal the reactor in the event of an accident had fake certificates that let them bypass safety testing. Deeper investigation into all 23 nuclear plants in South Korea uncovered knockoff drainpipes, power cables, valves, even nuts and bolts.

## Second-Rate Brakes on Airplanes

After parts distributor Electrospec bought thousands of brake components from a supplier in 2008, it hired a New Jersey test lab to verify their quality. The company then sold them as new. But a customer found that at least some were defective and very likely used. Electrospec sued the lab in 2014, alleging that it falsified the test results. The lawsuit is ongoing.

## Toxic Pills on Pharmacy Shelves

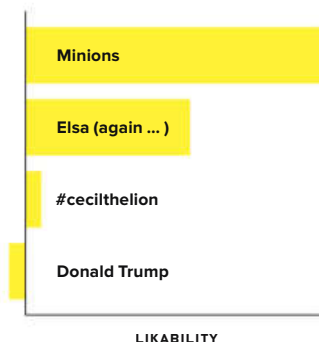
Last year, 54 countries seized 8.1 million fake antimalarials, vaccines, cancer and cardiovascular medicines, erectile dysfunction pills, and other drugs. Many contained no active pharmaceutical ingredient, too much, or the wrong kind—plus plenty of brick dust, talc, arsenic, floor wax, and printer ink. And it's not just online retailers: Pfizer has found fake versions of 26 of its drugs in the legit supply chain.



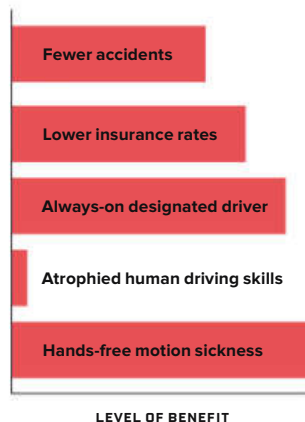
## CHARTGEIST

BY JON J. EILENBERG

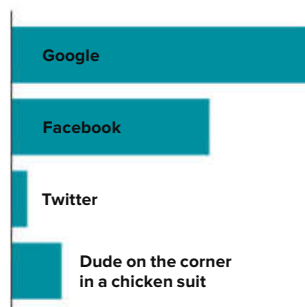
### 2015 Halloween Costumes



### Consequences of Self-Driving Cars



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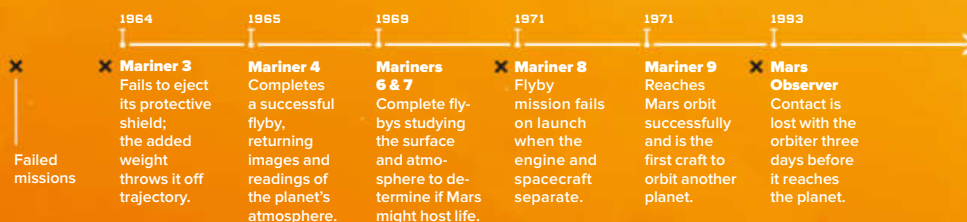
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## A Timeline of US Missions to Mars

BY DANIELLE VENTON



## THE GUIDE

# MARS OR BUST

There's something about the Red Planet—so close yet so far, inhospitable yet perhaps not totally uninhabitable—that keeps us dreaming about getting there one day. Here's what that trajectory might look like, from the fictional world of best seller *The Martian* (now a film starring Matt Damon that hits theaters in October) to the technology we still need to crack.

### 1. Q & A



**Andy Weir**  
Author  
of *The Martian*

It opens on a nightmare: An astronaut is left behind on Mars and must survive on the hostile planet. *The Martian* author Andy Weir, a former software engineer, includes so many technical details in his book—orbital trajectories, the molecular gymnastics required for turning air into water—that you might think a manned mission to Mars would be a cinch. Not so fast, Weir says. For one thing, we shouldn't get so hung up on humans actually reaching the surface. —DAVID FERRY



**WIRED:** In the book, Mars missions have become almost routine. Do you think we'll send astronauts to Mars anytime soon?

**Weir:** I suspect the first manned exploration will actually be sophisticated robots on the surface and humans in orbit.

#### Why's that?

One of the challenges of unmanned exploration is the robots have to land themselves—Mars is kind of a graveyard for probes. But imagine that they send seven probes into a parking orbit above the planet. Then they send humans. Now we have humans in orbit and in instant communication with the probes. The

humans make sure the probes land correctly.

**Then is it even worth it to send astronauts to the surface?**

Oh yeah. Why did Sir Edmund Hillary climb Everest? [Laughs.] But it's hard to justify the additional costs and risk. Still, I would like to have humanity able to survive if there's a catastrophe on Earth. It's not within our technological reach to colonize Mars right now, despite what some groups say, but we can do it eventually.

**Do you think sci-fi can influence (or inspire) policy?**

Things capture public attention, and if that's a side effect of my book, I'm happy. There's nothing NASA is going to learn from me—I'm just a space enthusiast. All I have to do is make shit up convincingly enough that you think it's true.





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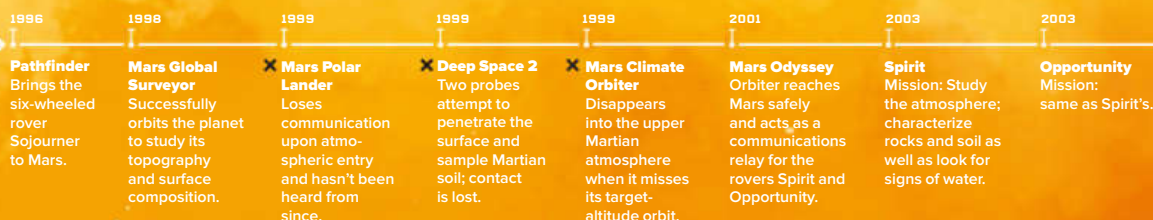
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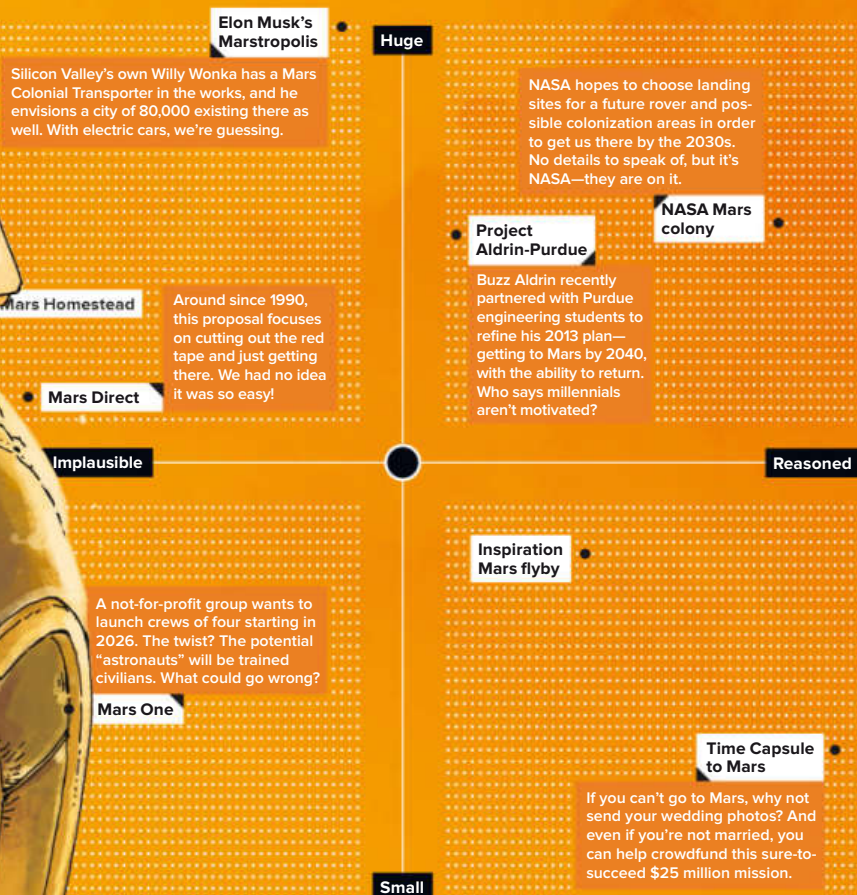
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## 2. Just because all signs point to Mars being a barren wasteland doesn't mean that folks don't have plenty of ideas of how to get there. Here's an overview. —BY SHARA TONN



## 3. Look on the Bright Side

Life on Mars will pose some serious challenges. All you need is an open mind—and the knowledge that you're not in Kansas anymore and will never see Kansas ever again. —RHETT ALLAIN

Mars is 140 million miles from Earth.

Pro	Con
If Earth is hit with a meteor or a deadly epidemic, people on Mars will likely be fine. Humanity will live to destroy another planet!	Light—and radio waves—can take from three to 22 minutes to travel from one planet to the other. That's one annoying Skype session.

Surface gravity on Mars is one-third that on Earth.

Pro	Con
Future Martian athletes might grow taller and be able to jump higher with similar effort. Basketball is going to be <i>fun</i> .	If they have to play an NBA team on Earth, Martians are screwed—competing at full g will be like wearing cement shoes.

Mars' atmosphere is 1 percent as thick as Earth's—and is mostly CO<sub>2</sub>.

Pro	Con
A low-density atmosphere makes it much easier to launch into orbit from the surface, which could facilitate crucial resupply trips.	Far less protection from cosmic radiation, which could make those resupply trips likely to include a crapload of aluminum foil.





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2016 GLC300 shown in Iridium Silver metallic paint with optional equipment. Vehicle available fall 2015. \*MSRP excludes all options, taxes, title, registration, transportation charge and dealer prep. Options, model availability and actual dealer price may vary. See dealer for details. ©2015 Mercedes-Benz USA, LLC

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ALPHA

THE GUIDE: MARS

2005

**Mars Reconnaissance Orbiter**

Studies the Martian climate and surveys sites where future missions could land.

2007

**Phoenix Lander**

Goes to study water history and habitability at the northern latitudes of Mars.

2011

**Curiosity**

The largest rover yet sent to the Red Planet successfully launches. It's still going!

2013

**Maven Orbiter**

Goes to study the atmosphere.

2020

**NASA**

The agency plans to send a successor to Curiosity.

2021

**Inspiration Mars**

Private venture plans to slingshot around Mars and Venus to demonstrate its technology.

2026

**SpaceX**

A crewed mission will launch and begin establishing a Martian base. Supposedly.

2030

**NASA**

Has vague plans to send humans to Mars.

#### 4. How We'll Colonize the Red Planet

1.

**Unlock the Water**

There is plenty of frozen water on Mars in the form of glaciers and polar caps. Plus, the soil is up to 60 percent H<sub>2</sub>O. But we'll have to unlock it somehow. If that fails, University of Washington researchers have a plan B: a device called the Water Vapor Adsorption Reactor—an industrial-level dehu-

midifier—that could extract water from the atmosphere.

2.

**Make Some Air**

That water is going to be important, because we'll need it to make oxygen. (You probably remember this from school but just in case: Stick two electrodes in a tank of water and turn on the power. Oxygen collects on the

positive side and hydrogen on the negative.) When NASA launches the heir to Curiosity in 2020, the agency will test a device that uses a similar process to split oxygen atoms off the CO<sub>2</sub> molecules in the Martian atmosphere.

3.

**Turn Up the Heat**

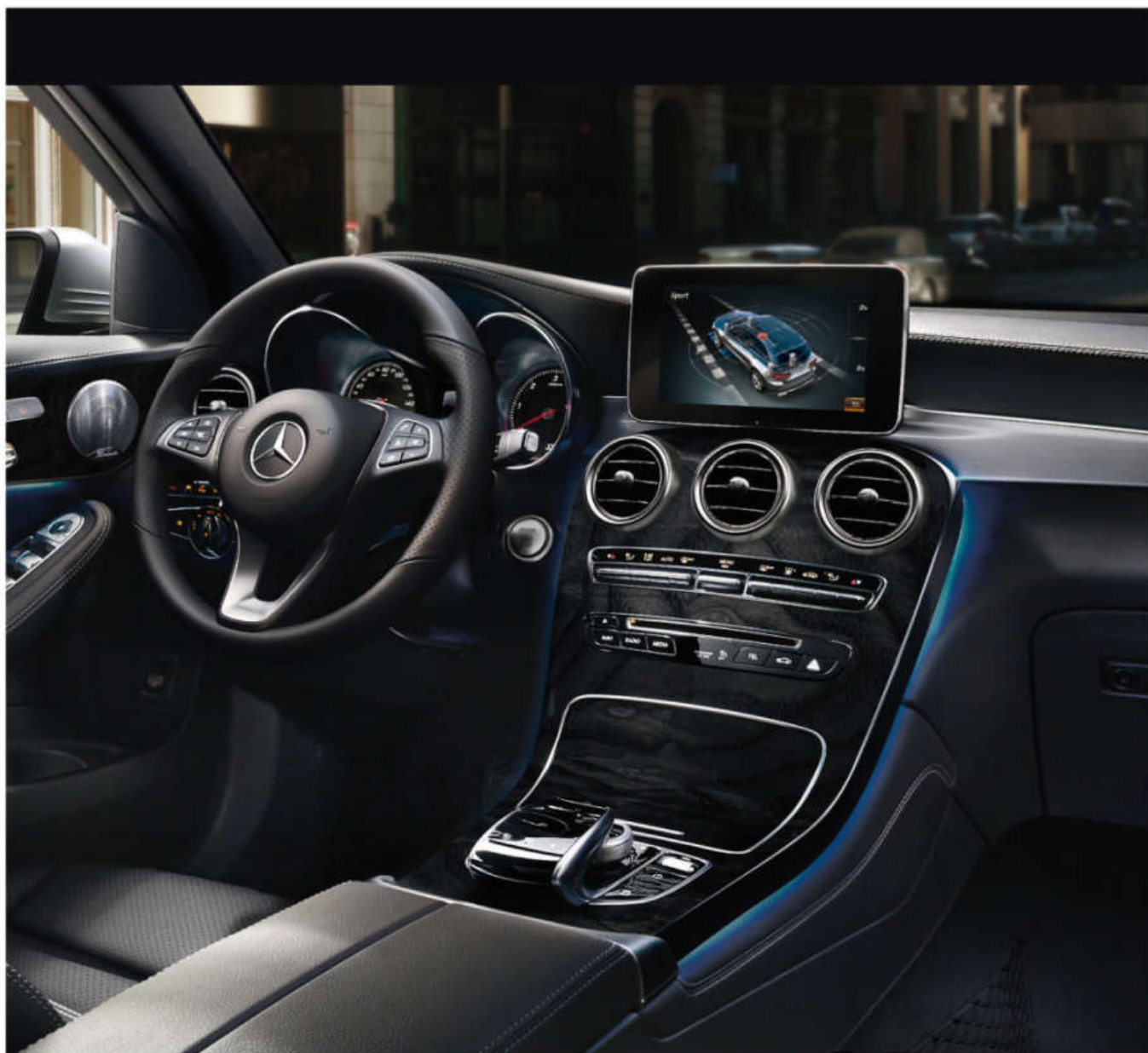
Terraforming! First, raise the temperature, perhaps with vast sunlight-reflecting mirrors. Frozen gases will release, forming a denser atmosphere and causing a greenhouse effect. Water will flow. Plants will grow, releasing oxygen. If life once existed on Mars, maybe it can again.

#### 5. What It Would Be Like

Martha Lenio, mission commander of the HI-SEAS III Mars simulation program, tells us what we're really up against.

For a three-year mission with a spaceship, you have to figure out what spare parts you need, how to fix things when you're far away from Earth, and how to deal with waste. I have no hesitation about having enough solar-powered batteries and hydrogen. I can see us recycling water and composting waste. I'm confident we can do missions where we come back to Earth or are resupplied, but I can't see a way for us to live sustainably on Mars. We haven't figured out how to live sustainably on Earth yet—and Mars is very harsh. —AS TOLD TO SHARA TONN





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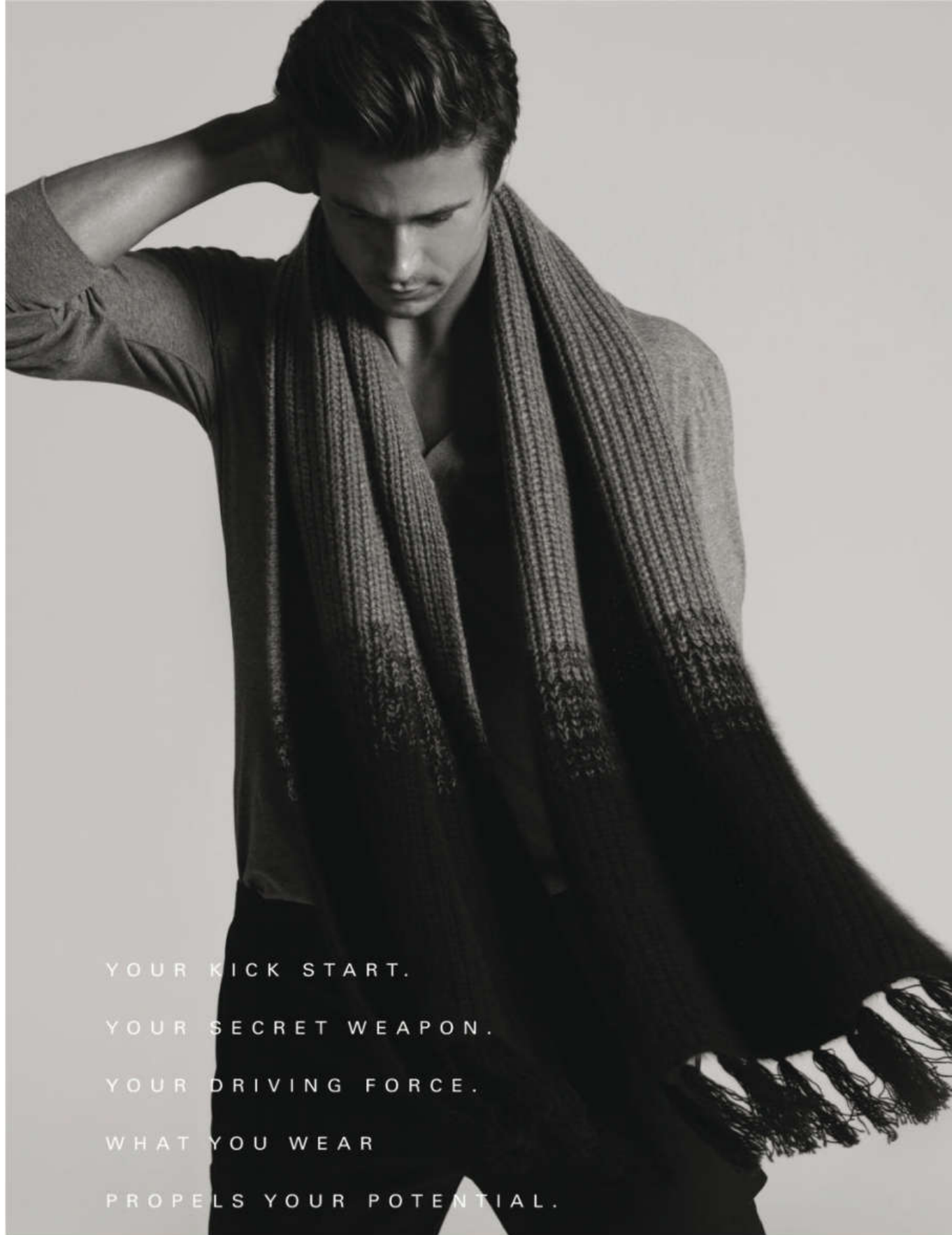


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Q:

# IF MY SPOUSE AND I SIT WATCHING OUR OWN STUFF ON OUR OWN DEVICES, WILL WE DRIFT APART?

BY JON MOOALLEM

A:

Ever seen *Poldark*? It's a "Masterpiece"—that brand of miniseries on PBS. It may be an actual *masterpiece* too, but I wouldn't know. I've never seen a single second of it. That said, let me tell you what I do know: We are in England, sometime shortly after the American Revolution. Ross Poldark, a hunky, brooding redcoat, returns from the war to find his family's mine—coal, probably?—in disrepair. One day he saves a penniless lady's dog while the lady is dressed like a boy (I didn't catch why she was dressed like a boy) and winds up hiring her as his maid. Her name is Demelza. She is "fiery," according to the PBS website, which I looked at to make sure I was spelling her name correctly. They get married. Their partnership is beautiful and respectful and modern. But eventually, a vertiginous distance is cleaved between them. ¶ Here's some of what happens, as I understand it. Poldark gets sad. He comes to blame himself for the imprisonment of one of his mine workers—a good-hearted, sickly guy whom the magistrate tosses into some sewerlike jail, where he gets gangrene—and withdraws into solipsism and alcohol. Demelza, meanwhile, begins operating behind

Poldark's back to reunite his cousin with a disgraced sea captain. There's a confrontation in a courtroom! A big fight at a ball! A duel! But the most heartrending drama is subtle and domestic. Because, you see, Poldark and Demelza stop communicating; the trust between them corrodes. There are scenes of them lying in bed together, talking but not really talking, cloistered behind their sorrow and secrecy. Or at least there's one scene like that, which my wife said was very important though she couldn't remember the dialog exactly.

That's where my imperfect understanding of *Poldark* comes from. My wife watches the show just as religiously as I avoid it. I'm sure it's great, but it's just not my thing. Not at all. The last time *Poldark* was on, I curled up on the other side of the room and read a magazine profile of beefcake Channing Tatum.

Still, the next day my wife and I went out to lunch. It was warm and we sat outside. I had a bagel with salmon; she had a hummus plate. A finch hopped around the café's patio like some destitute miner's child, scrabbling for crumbs. We kept our phones in our bags. And we talked. She told me what she thought about *Poldark*, and I told her what I thought about Channing Tatum. It was wonderful.

We've all been like Ross and Demelza: in the same room but far away, separated by the parallel streaming narratives we're embroiled in. Sometimes that's inevitable—and totally OK. It's not always possible, in every circumstance, to be together, together. In fact it's proof of how lucky we are. Once, you might have been trapped in some drab, oppressively mannered coal-mining backwater where, on any given night, you could either (a) go watch some terriers fight or (b) sit at home watching the fleas hop around your bedspread until your candle burned out. Or—shoot, I don't know—(c) mend a hat. Those were your only options! Now, you and your partner each have access to universes of knowledge and entertainment and taste.

The truth is, human experience feels too gorgeous and expansive right now for individuals to make sense of it on their own. Life goes better when it's a two-person job: *You go that way, I'll check out this way, then we'll meet over there.* Differing interests—natural inclinations to diverge instead of run in narrow parallel—make relationships vibrant.

So please don't panic. Sit on the couch; carry on. Just be sure to create other, more favorable circumstances in which to







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Philips Sonicare's DiamondClean toothbrush with USB chargeable travel case is the ideal accessory for all of your travels. And to put its technology and long-lasting battery to the test, WIRED Insider and Philips Sonicare teamed up with two adventure seekers as they embarked on two separate journeys with their DiamondClean in hand. @AliceGao and @BenjaminHeath set out to #getthefeeling as they explored two Portland towns on either side of the U.S. Follow along as @WIREDinsider puts the spotlight on their adventures.

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## IVY INNOVATOR FILM AWARDS

Josh Radnor hosts 2nd annual IVY Innovator Awards for Film presented by Cadillac

On August 4th, IVY, the world's fastest growing collaborative community, hosted its second annual IVY Innovator Film Awards presented by Cadillac, at SmogShope in Los Angeles. Among the six finalists, Seed&Spark Founder & CEO Emily Best was honored with the IVY Innovator Award for her contributions to the film industry by actor, director, and *How I Met Your Mother* star Josh Radnor. This year's finalists included Luke Kelly-Clyne, Elizabeth Dell, Scott Glosserman, Sean Carey, and Don Napoleon. Other notable guests on the red carpet included actresses Caitlin Fitzgerald, Renee Olstead, Scout Compton, and Jillian Rose Reed.

With more than 10,000 inspiring members, IVY brings together the next generation of leading entrepreneurs, artists, and innovators to spark world-changing collaborations. The IVY Innovator Program is designed to showcase and inspire the next generation of leading minds and represents the joint commitment of IVY and Cadillac in supporting those who embody the best of the innovative American spirit in Technology, Film, and Design.

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connect too. I think Channing Tatum said it best in a little movie called *The Vow*: Truly loving someone means always knowing “in the deepest part of my soul that no matter what challenges might carry us apart, that we’ll always find a way back to each other.”

Q:

## IS IT OK IF MY NANNY THINKS EARTH IS 6,000 YEARS OLD?

A:


Giovanni Cellini was a draftsman, musician, and musical instrument maker—a hunky Renaissance man, figuratively and literally, “the stoutest youth of Florence and of all Italy to boot,” his father bragged in the late 1400s.

And yet, Giovanni believed many unscientific things.

Take salamanders. Centuries of pseudoscience swirled around the creatures at that point—that they vomited a milky ooze that made people go bald; that they could withstand even the hottest fires; or they were born out of fire; or that fire was their only food. They lived at the beguiling, supernatural edge of people’s imaginations, somewhat rare as physical creatures, outsized and powerful as ideas.

Well, one day Giovanni had a fire going and was sitting beside it, playing the viol and singing. “Happening to look into the fire,” his son Benvenuto writes in his autobiography, his father “spied in the middle of those most burning flames a little creature like a lizard, which was sporting in the core of the intensest coals.” Instantly Giovanni called his 5-year-old son over and clobbered him on the side of the head. Giovanni told Benvenuto he punched him only “to make you remember that that lizard which you see in the fire is a salamander.” Boxing his son’s ears, in other words, was a way to ensure that little Benvenuto never forgot this blessed event—to make it a special memory.

What I’m trying to say is, Giovanni Cellini would have made a lousy nanny. But what disqualifies him from child care isn’t that he believed a salamander to be some kind of necromantic devil-lizard. What disqualifies him is that he thought it was a good idea to punch a child in the head to make him remember seeing an amphibian.

So, how well do you know your nanny? Because unscientific convictions alone aren’t likely to spill over onto your child in an irreparable way. Even if she does proselytize, you can tell her to stop or you can offer more intelligent counterprogramming at home. The more important question is, how is her judgment otherwise? What goodness, and what lunacy, is she capable of when standing with your child—without you—in front of some furious fire? 



## JARGON WATCH

### DNA ambulance

n. / ,dē-en-’ā  
’am-byə-lən(t)s /

Emergency intracellular transport for damaged genes. It’s a protein complex that shuttles broken DNA strands to little repair stations in the cell nucleus. Problem is, the patch jobs can go awry, causing the cells to become cancerous. That makes these enablers a possible target for new anticancer drugs.

### Snotbot

n. / ’snät-’bāt /

A drone that collects mucus from spouting whales by hovering over their blowholes. It lets marine biologists gather data on the animals’ health—hormone levels, bac-

terial loads, and so on—without stressing them. Much nicer than the old method: chasing whales in loud motorboats and shooting them with tissue-sampling darts.

### PoWiFi

n. / ’paū-’wī-’fī /

Power over Wi-Fi. A method of charging electronic devices through the air by harvesting energy from Wi-Fi signals. Because the FCC limits its router transmissions to just 1 watt of power, it won’t work for phones. But it’s perfect for all those low-power sensors envisioned in the Internet of Things, eliminating the need to wire them in place.

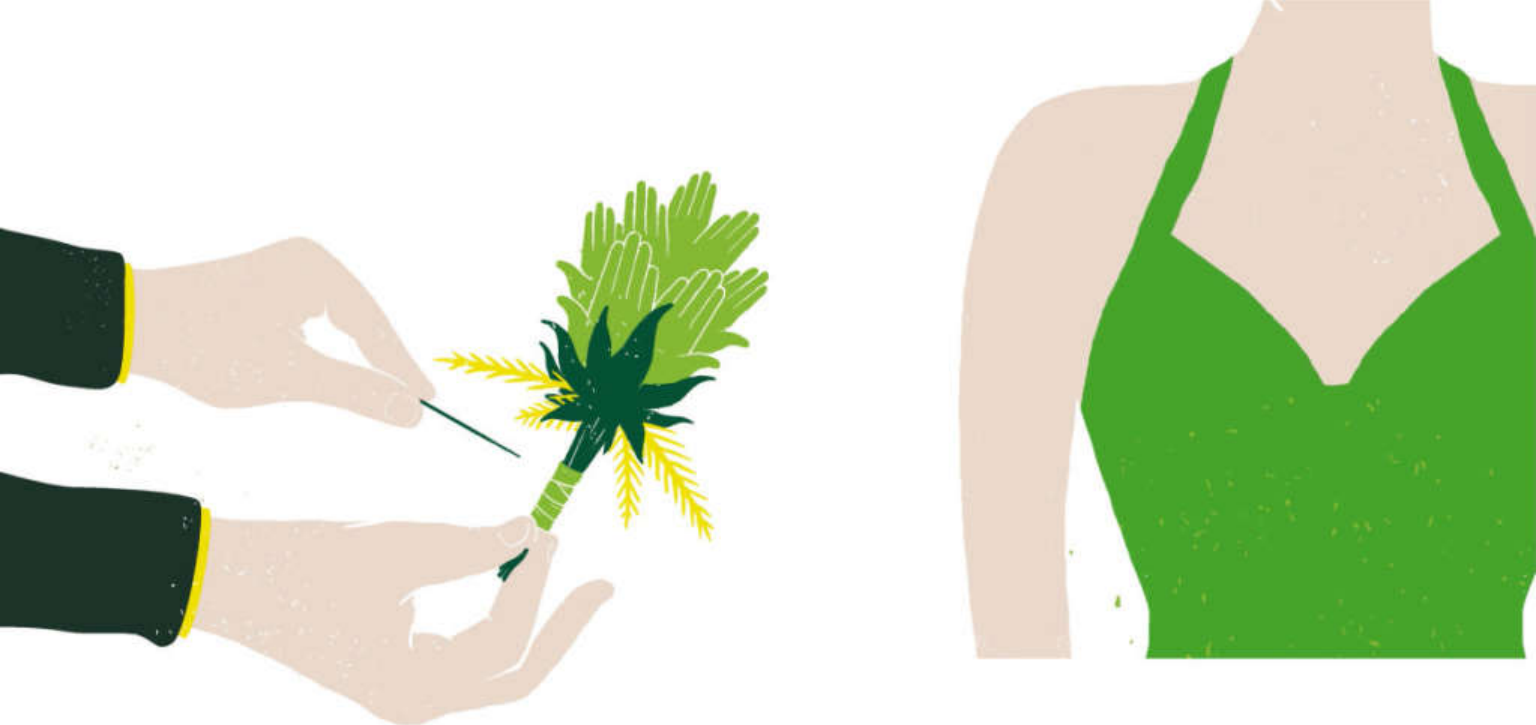
### emoji passcode

n. / ,ē-’mō-jē  
’pas-kōd /

A mobile-banking PIN based on smiley faces instead of numbers. The UK firm behind the scheme touts the passcodes as easier to remember and more secure, since its 45 millennial-friendly emojis yield more possible combinations than our paltry ten digits. Sadly, no prayer-hands option—the image that usually leaps to mind when we check our bank balance. —JONATHAN KEATS [jargon@WIRED.com](mailto:jargon@WIRED.com)







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ALPHA

TRAINING

### Base Strength

To build a sturdy foundation so Watt can throw off blockers, Arnett relies on exercises from the weight lifter's handbook, like dead lifts and snatch pulls. Arnett likes that they come with a built-in safety mechanism: If Watt is out of the ideal position, Arnett yells "Drop it!" and the bar crashes safely to the floor.



### Quick Hands

Watt has broken up 37 passes in his career, earning the nickname J. J. Swat. He developed his quick hands as a hockey player growing up. To keep them fresh he often heads over to a machine that throws passes, stands just in front of it, and grabs balls with one hand as they're fired at 40 miles per hour.



### Tough Shoulders

Watt's swim move, a longtime favorite of pass-rushers, sends offensive linemen stumbling. Because Watt's shoulders take a beating, Arnett uses dumbbells, weighted push-ups, and kettlebells to keep the player's enormous shoulders strong. The fat grip on a kettlebell allows Watt to squeeze it more, which helps keep the shoulder stabilized.

### Lateral Moves

Sometimes the key to making a tackle lies in quick lateral movement, and Watt is remarkably nimble for his size. To develop this skill, Arnett uses shuffle drills, making sure Watt keeps his knees bent and drives his feet through the ground. "We don't do it till he gets it right," Arnett says. "We do it till he never gets it wrong."



### Fast Feet

A football play lasts just seconds, so the man with the quickest first step grabs the advantage. To build explosiveness, Arnett and Watt head to the sandbox for plyometrics—box jumps, hurdle hops, and long jumps—with a focus on keeping Watt's feet aligned beneath his hips. The result? Enough power to jump onto a 5-foot-high box from a standing start.

# BEST DEFENSE

## J. J. WATTAGE

**IN JUST FOUR YEARS** in the NFL, Houston Texans defensive end J. J. Watt has become professional football's most physically dominant force. He's the first player ever to twice record 20 or more quarterback sacks in a single season. Today, Watt is a 6' 5", 289-pound tower of power, but trainer Brad Arnett remembers the skinny high school sophomore who first walked into his Waukesha, Wisconsin, gym 10 years ago. Arnett applied exercise science and old-school techniques to transform Watt into Andrew Luck's worst nightmare. —JEFF BECKHAM

### The Future of Football

In February 2016, Super Bowl 50 will be played in the heart of Silicon Valley. Since the first Super Bowl, the game has changed: Players are bigger and faster, and stadiums have become high tech entertainment venues. What

will the next 50 years bring? WIRED is teaming up with *Sports Illustrated* to explore what the NFL will look like when Super Bowl 100 is played in 2066. Follow our coverage at [WIRED.com/sb100](http://WIRED.com/sb100).

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# MAKE SOME NOISE BAFFLE WEB TRACKERS

**ONLINE AD NETWORKS** and search engines love it when you surf around. Everything you do—every page you load, every query you type—helps them build a profile of you, the better to sell ads targeting your interests. Spy agencies are probably also happy to track your online moves. ¶ But today they're all having trouble figuring me out, thanks to some sneaky browser plug-ins. One, AdNauseam, clicks every ad on every page I visit, baffling ad networks. When I do a search, TrackMeNot sends a stream of fake queries in the background—like “conan o'brien” and “watch tokyo samsung”—so Google and Bing can't easily profile me either. ¶ This is “obfuscation,” and it's a fascinating development in our relationship to online surveillance. ¶ “We want everyone to benefit from this amazing online technology, but we want to impose constraints on it,” says Helen Nissenbaum, director of the Information Law Institute at New York University and a

leading thinker in the field of obfuscation. “Right now the technology is stacked against you.” Working with programmers overseas, Nissenbaum has spent the past decade crafting apps like AdNauseam and TrackMeNot, and this fall she published a book on why obfuscation is a strategy for modern life.

Reason one: It's increasingly hard to “opt out” of online tracking. “Unless you want to go live in a cave away from society,” Nissenbaum notes, you need to be online—often for work or to access government services. Online services claim they're voluntary, but the cost of being a refusenik grows every day.

In this context, obfuscation is a clever judo move. It's a way for people in a relatively weak position—which is to say all of us, compared with Google or Facebook—to fight back. You exploit your adversaries' inherent weakness: their insatiable appetite for data.

Obfuscation has a long pedigree. Airplanes in World War II dropped chaff to confuse enemy radar. WikiLeaks has been known to generate fake traffic as cover for leakers who are uploading documents to the site. In all cases, the key to obfuscation, says Vincent








ZOHAR LAZAR

Toubiana, a developer of TrackMeNot, "is to create noise."

As you might imagine, the folks in power are unthrilled by this monkey-wrenching. (One executive of an ad-supported site harshly criticized Nissenbaum at a talk she gave.) Obfuscation, they say, is a form of unfair "free riding." Search engines use tracking to improve the overall quality of results—so TrackMeNot users get those benefits without contributing their own personal data. Nissenbaum and her coauthor, Finn Brunton, think obfuscators are in the clear as long as their tools are open to everyone and they don't make other users worse off.

A bigger problem with obfuscation is that it doesn't curtail online tracking. Only legislation could do that, and it's pretty unlikely to come about. Nor is obfuscation, as Nissenbaum and her collaborators hasten to point out, true security. To really *hide* from, say, a repressive government, you need unbreakable encryption.

But as a form of everyday protest, I love the concept. Indeed, I can imagine plenty more ways to conceal my tracks. How about a hack that generates fake GPS readings in mobile apps? If I'm going to be followed online all day, I might as well leave some digital chaff. 

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HIT THE ROAD

HONDA NC700X DCT ABS

# FETISH STREET SMART

COMMUTING BY MOTORCYCLE is like being able to see invisible spectra of light; extra dimensions interlaced between unknowing denizens of a flatter world. While they creep down the boulevards of a metal-box hell, you ride private pathways, engaged with the pavement instead of isolated from it. Honda's nimble NC700X DCT ABS was bred for this. Its upright posture gives you great visibility and a seating position that offers the leverage to make quick direction changes, while its stout brakes and suspension keep you safe. The cavernous storage compartment securely swallows your backpack or even a full-face helmet while you grab doughnuts for the team. And its push-button shifters let you rip through gears without hand fatigue. (It will even shift for you, if you want.) Of course, a factory bike's features always get dialed down to hit a certain price point. But WIRED doesn't compromise; we kitted this NC700X out with all the best commuting accessories, including tail bags, a custom seat, LED lights, and a louder horn. —JOE BROWN

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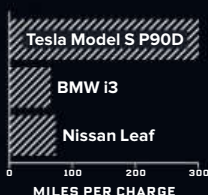
HIT THE ROAD

ELECTRIC CARS

# TOP 3 CHARGED UP

**Gasoline!** It's expensive, flammable, inefficient, and terrible for the planet. Make your next car the kind that drinks electrons instead of petrol. —ALEX DAVIES

## You'll Go Far



1

### Nissan Leaf

#### BEST COMPACT

Most EVs blend in with the pack, but if you want everyone to know you're riding the lightning, the ever-funky Leaf is the way to go. It scoots 84 miles on a charge, typical of a non-Elon electric. To reap the benefits without the stares, wait for next year's revamped, more sober design.

**\$29,010**

2

### BMW i3

#### BEST FAMILY

Munich's urban electric doesn't look like a BMW, but it sure drives like one. The motor puts out a respectable 170 horses, and the 22-kWh battery is good for 81 miles. Suicide doors let you pack more stuff—like the kids—into the back.

**\$42,400**

1

2

3

3

### Tesla Model S P90D

#### BEST PERFORMANCE

If you're looking to burn cash, not gas, nothing beats Tesla's newest luxorocket. Two motors (one in front, one in back—all-wheel drive!) and a 90-kWh battery pack give this sedan 300 miles of go juice. It even has an autopilot mode for (some) highway driving.

**\$108,000**



A NEW PHENOMENON BEGINS

# HEROES

## REBORN



NEW  
SERIES

**THURSDAYS 8/7c**



**NBC**

FOLLOWED BY THE BLACKLIST



# GEARHEAD POWER TRIP

The road doesn't always have to lead somewhere. It can be a destination in itself. —MICHAEL CALORE

1

## OluKai Akepa Moc Kohana

Working the clutch for hours on end calls for footwear that offers maximum comfort but a sure feel on the pedals. Enter the driving moccasin—a flexible leather loafer with a grippy rubber sole. The Akepa's topside perforations keep your tootsies cool, and the washable footbed is supremely cushy.

**\$160**

2

## Shinola Runwell Chrono 41mm

Rely on this gorgeous quartz-movement wrist clock to keep track of your drive time. The sapphire-topped stainless steel case houses a dual-dial chronograph, and the stitched American leather strap oozes character. And it's all hand-assembled in Detroit, just like your dad's Buick.

**\$800**

3

## GoPro Hero4 Black With Suction Cup Mount

Affix this rig to the hood of your car and capture the drama of the open road. Use it to record only the twisty bits, or set it to time-lapse mode and let it roll all day. When you hit the water, stick it to your kayak.

**\$540**

4

## Salt + Aether Explorer Sunglasses

These shades are built for going fast. The windscreens on the temples have tiny holes to preserve your peripheral vision while blocking the cross-breezes from that dropped ragtop. The photochromic lenses darken when the sun's rays grow intense. And they just look badass.

**\$600**

5

## National Geographic Road Atlas Adventure Edition

When you need the shortest route, use a maps app. When you want to live a little, use this analog road atlas. Maps of all 50 states include details like where to find trailheads, hiking spots, parks, and campsites. Now you know where to stop and stretch your legs.

**\$20**





*Axe White Label*  
**BODY WASH**

---



FOR A FRESH, INVIGORATING CLEAN

---

# HEAD-TO-HEAD HITCH A RIDE

Those trails up north are aching to be shredded. Mount your bike to the car and get a move on. —RENE CHUN

## Küat NV

**BEST FOR: Two-cyclist households with a taste for mud**

The Küat NV uses a hitch-mount design with a traylike rack—there's no need to remove tires or hoist bikes onto the roof. It's the perfect rack for hauling fancy rides and preserving spenny paint jobs. There's even a built-in repair stand for on-the-fly adjustments. And when you need to open the hatch of your Evoque, the whole assembly pivots down out of the way, bikes and all.

**\$549**

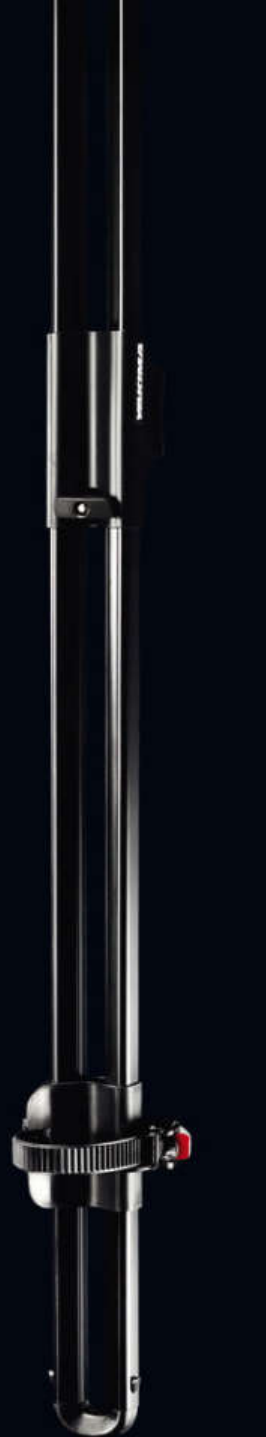


## Yakima ForkLift


**BEST FOR: The lone-wolf biker with a roof-barred Prius**

Bike racks that mount on the roof can produce wind drag and noise at highway speeds. On the other hand, a roofie anchors bikes vise-tight and won't obstruct the trunk or hatchback. There are cheaper one-bike carriers, but the ForkLift is the best: It fits any roof bars, holds practically any bike, and installs without tools. Just remember to save room in the trunk for the front tire.

**\$159**





The background of the advertisement is a complex, abstract geometric pattern. It features a network of thin grey lines connecting various points. Some points are represented by solid black dots, while others are small, multi-colored squares (blue, yellow, purple, red). There are also larger, light blue circles and starburst-like patterns where many lines radiate from a central point. The overall effect is one of dynamic, interconnected movement.

# The future belongs to the fast.



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# BENCHMARK SACRE CAR!

Sixty years ago, a French automaker debuted a tech-packed model that dragged car design into the future. —ALEX DAVIES

WHEN CITROËN UNVEILED the DS in Paris in October 1955, the crowd responded with 750 orders in the first 45 minutes. The car was like nothing the world had ever seen. It paired an offbeat design with new technologies to make driving safer and more efficient. The disc brakes were operated by a rubber button instead of a pedal, the dashboard was padded to reduce injuries in a crash, and, just to be different, the steering wheel had one single spoke. But the biggest innovation was hidden beneath the floor: The avant-garde body rode on a Citroën-designed hydropneumatic suspension, which absorbed the shocks of the road better than any metal spring, could raise and lower the car effortlessly, and made for a pillowy, bump-free ride. That suspension helped save Charles de Gaulle's life: In 1962, when gunmen fired at the French president's DS, it adjusted to the flattened tires and let the driver speed to safety.

**\$6,000 and up**



Philosopher Roland Barthes compared the DS's radical shape to Jules Verne's *Nautilus*.





# APP PACK DRIVE TIME

Let your phone ride shotgun, where it can make sure you see more sights and hit fewer roadblocks. —DAVID PIERCE

## Navigation



### Waze

This is the best of the real-time, crowd-sourced traffic apps. Millions of users constantly update info about accidents, roadwork, and traffic. Skirt the logjams; find the shortcuts.

**FREE (IOS, ANDROID, WINDOWS PHONE)**



### Roadtrippers

See more between points A and B. Plot your route on the in-app maps and let experienced travelers tell you which detours are most worthy. No real agenda? Pick a pre-made itinerary and let the app lead the way.

**FREE (IOS, ANDROID)**

## Places



### Foursquare

Instantly become a local in a strange town. Search for food, drinks, or stuff to do. Tips are listed for every spot too—you'll always know which local IPA is best. **FREE (IOS, ANDROID, WINDOWS PHONE)**



### Findery

Everything's better with an awesome tour guide. Findery shows you not only nearby places but also notes left about them by others—personal stories, photos, tips, etc. Compose your own notes and keep them private or make them public.

**FREE (IOS, ANDROID)**

## Entertainment



### Tuneln

Passing through nowhereville? Forget spinning the dial—Tuneln contains livestreams for 100,000 radio stations from around the world. Check in on the game from six states away. Good-bye, static and shock jocks. Hello, epic road trip soundtrack.

**FREE (IOS, ANDROID, WINDOWS PHONE)**



### Overcast

The best of the myriad podcast clients, Overcast helps you find new shows with simple directories and suggestions from Twitter. A \$5 in-app purchase unlocks additional features, like speed controls and a voice booster.

**FREE (IOS)**

## Diagnostics



### Automatic

Plug Automatic's tiny \$100 dongle into your dash, then sync it with the app. Get stats on your driving, find your car in the parking lot, and learn why that check engine light is on. It tracks your gas usage too. **FREE (IOS, ANDROID)**



### Openbay

If there's no YouTube video to show you how to fix what's wrong, this app will help you find a nearby mechanic at the right price. Openbay helps diagnose the problem and compare labor rates for the fix. **FREE (IOS)**

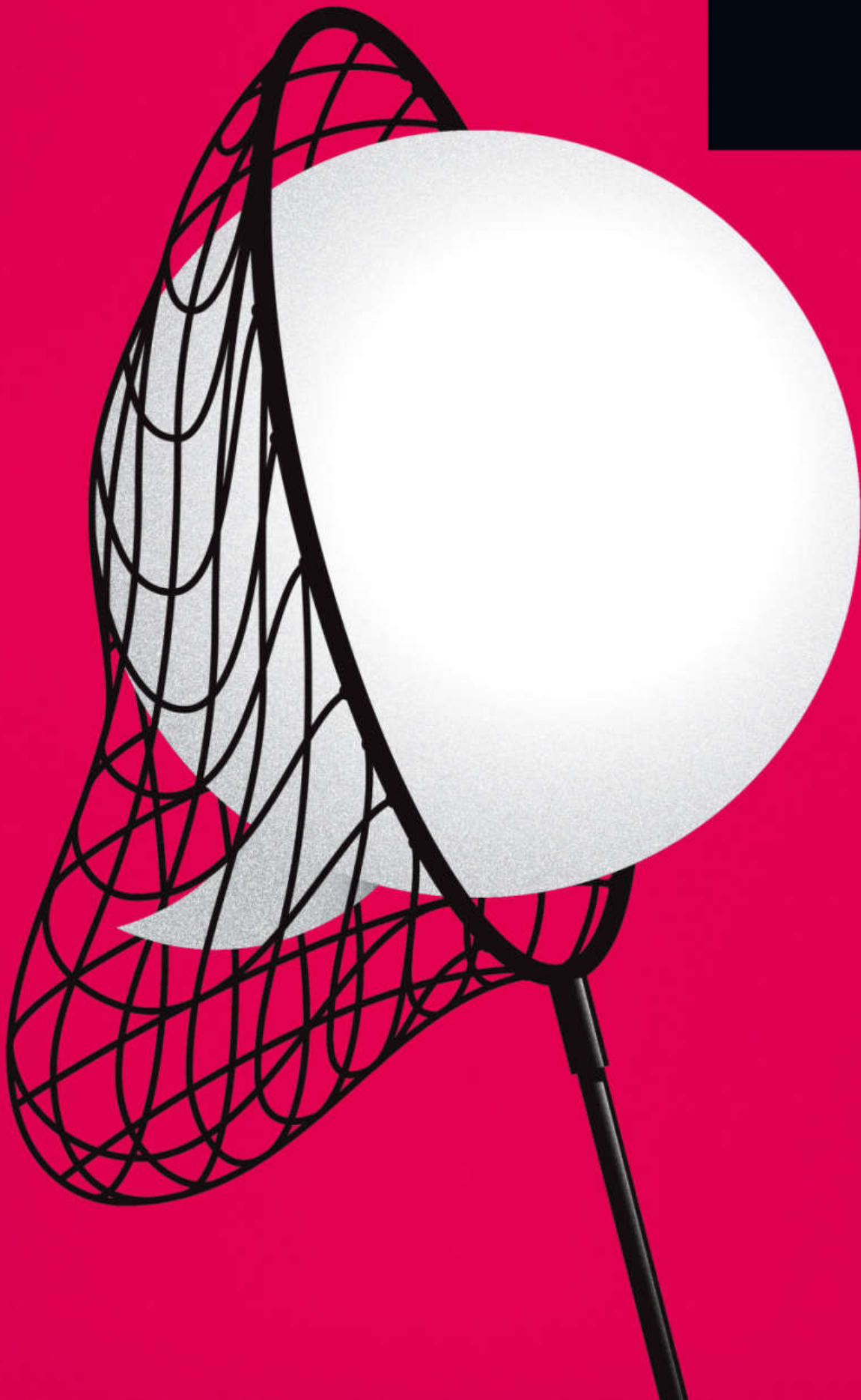
Value is  
hiding.  
Everywhere.



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PORTION OF TEENAGERS WHO USE VOICE SEARCH, BY TASK:



## Say What?

A true voice interface is finally within reach. Get ready to talk to your devices the way you talk to your friends.

BY DAVID PIERCE

**HERE'S A QUICK STORY** you've probably heard before, followed by one you probably haven't. In 1979 a young Steve Jobs paid a visit to Xerox PARC, the legendary R&D lab in Palo Alto, California, and witnessed a demonstration of something now called the graphical user interface. An engineer from PARC used a prototype mouse to navigate a computer screen studded with icons, drop-down menus, and "windows" that overlapped each other like sheets of paper on a desktop. It was unlike anything

Jobs had seen before, and he was beside himself. "Within 10 minutes," he would later say, "it was so obvious that every computer would work this way someday."

As legend has it, Jobs raced back to Apple and commanded a team to set about replicating and improving on what he had just seen at PARC. And with that, personal computing sprinted off in the direction it has been traveling for the past 40 years, from the first Macintosh all the way up to the iPhone. This visual mode of computing ended the tyranny of the command line—the demanding, text-heavy interface that was dominant at the time—and brought us into a world where vastly more people could use computers. They could just point, click, and drag.

In the not-so-distant future, though, we may look back at this as the wrong PARC-related creation myth to get excited about. At the time of Jobs' visit, a separate team at PARC was working on a completely different model

# Thwart.



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<sup>1</sup>2015 Fortune 500 list: [fortune.com/fortune500](http://fortune.com/fortune500)

SOURCE: GOOGLE MOBILE VOICE SURVEY, 2014; NOTE: AREA OF PIE CHARTS DOES NOT INCLUDE "SPEECH BUBBLE" TAIL, BUT IT'S COOL YOU WERE WONDERING ABOUT THAT.

of human-computer interaction, today called the conversational user interface. These scientists envisioned a world, probably decades away, in which computers would be so powerful that requiring users to memorize a special set of commands or workflows for each action and device would be impractical. They imagined that we would instead work collaboratively with our computers, engaging in a running back-and-forth dialog to get things done. The interface would be ordinary human language.

One of the scientists in that group was a guy named Ron Kaplan, who today is a stout, soft-spoken man with a gray goatee and thinning hair. Kaplan is equal parts linguist, psychologist, and computer scientist—a guy as likely to invoke Chomsky's theories about the construction of language as he is Moore's law. He says that his team got pretty far in sketching out one crucial component of a working conversational user interface back in the '70s; they rigged up a system that allowed you to book flights by exchanging typed messages with a computer in normal, unencumbered English. But the technology just wasn't there to make the system work on a large scale. "It would've cost, I don't know, a million dollars a user," he says. They needed faster, more distributed processing and smarter, more efficient computers. Kaplan thought it would take about 15 years.

"Forty years later," Kaplan says, "we're ready." And so is the rest of the world, it turns out.

Today, Kaplan is a vice president and distinguished scientist

at Nuance Communications, which has become probably the biggest player in the voice interface business: It powers Ford's in-car Sync system, was critical in Siri's development, and has partnerships across nearly every industry. But Nuance finds itself in a crowded marketplace these days. Nearly every major tech company—from Amazon to Intel to Microsoft to Google—is chasing the sort of conversational user interface that Kaplan and his colleagues at PARC imagined decades ago. Dozens of

### PIPE DOWN, JARVIS

For decades, the talking tech in movies has eclipsed anything we've been able to build in the real world. That's finally starting to change. —D.P.

startups are in the game too. All are scrambling to come out on top in the midst of a powerful shift under way in our relationship with technology. One day soon, these companies believe, you will talk to your gadgets the way you talk to your friends. And your gadgets will talk back. They will be able to hear what you say and figure out what you mean.

If you're already steeped in today's technology, these new tools will extend the reach of your digital life into places and situations where the graphical user interface cannot safely, pleasantly, or politely go. And the increas-

ingly conversational nature of your back-and-forth with your devices will make your relationship to technology even more intimate, more loyal, more personal.

But the biggest effect of this shift will be felt well outside Silicon Valley's core audience. What Steve Jobs saw in the graphical user interface back in 1979 was a way to expand the popular market for computers. But even the GUI still left huge numbers of people outside the light of the electronic campfire. As elegant

language. Ask Google Now for the population of New York City and it obliges. Ask for the location of the Empire State Building: good to go. But go one logical step further and ask for the population of the city that contains the Empire State Building and it falters. Push Siri too hard and the assistant just refers you to a Google search. Anyone reared on scenes of Captain Kirk talking to the *Enterprise's* computer or of Tony Stark bantering with Jarvis can't help but be perpetually disappointed.

### Computer from Star Trek

A kind of proto-Google with a voice, the *Enterprise's* computer provides status updates, calculations ... and tea, Earl Grey, hot.



### HAL 9000 from 2001: A Space Odyssey

HAL, the psychotic AI with an FM-DJ voice, is able to control every last detail of a mission to Jupiter.

### KITT from Knight Rider

Michael Knight's in-dash AI partner is sarcastic, indestructible, and always ready to get Knight out of a jam.



### Jarvis from Iron Man

You never see Jarvis, but his diagnostics, worried nagging, and instant calculations are crucial to Iron Man's superhero-ness.



and efficient as it is, the GUI still requires humans to learn a computer's language. Now computers are finally learning how to speak ours. In the bargain, hundreds of millions more people could gain newfound access to tech.

### VOICE INTERFACES HAVE

been around for years, but let's face it: Thus far, they've been pretty dumb. We need not dwell on the indignities of automated phone trees ("If you're calling to make a payment, say 'payment'"). Even our more sophisticated voice interfaces have relied on speech but somehow missed the power of

Ask around Silicon Valley these days, though, and you hear the same refrain over and over: It's different now.

One hot day in early June, Keyvan Mohajer, CEO of SoundHound, shows me a prototype of a new app that his company has been working on in secret for almost 10 years. You may recognize SoundHound as the name of a popular music-recognition app—the one that can identify a tune for you if you hum it into your phone. It turns out that app was largely just a way of fueling Mohajer's real dream: to create the best voice-based artificial-intelligence assistant in the world.

David Pierce  
(@piercedavid)  
is a senior writer at  
WIRED.



The prototype is called Hound, and it's pretty incredible. Holding a black Nexus 5 smartphone, Mohajer taps a blue and white microphone icon and begins asking questions. He starts simply, asking for the time in Berlin and the population of Japan. Basic search-result stuff—followed by a twist: "What is the distance between them?" The app understands the context and fires back, "About 5,536 miles."

Then Mohajer gets rolling, smiling as he rattles off a barrage



**Samantha from Her**

She starts by reading his email—and eventually becomes much more than a helpful assistant in Theodore Twombly's ear.

**Mohajer rattles off a barrage of questions, and the app answers every one. Correctly.**

of questions that keep escalating in complexity. He asks Hound to calculate the monthly mortgage payments on a million-dollar home, and the app immediately asks him for the interest rate and the term of the loan before dishing out its answer: \$4,270.84.

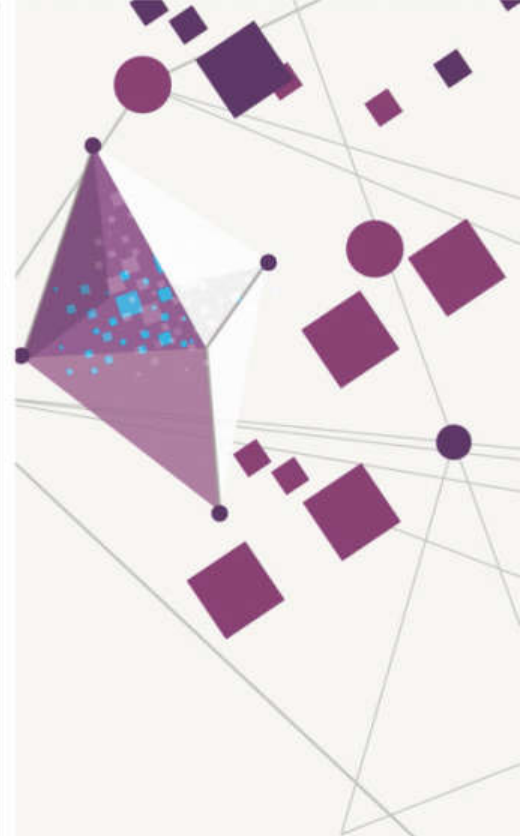
"What is the population of the capital of the country in which the Space Needle is located?" he asks. Hound figures out that Mohajer is fishing for the population of Washington, DC, faster than I do and spits out the correct answer in its rapid-fire robotic voice. "What is the population and capital for Japan and China, and their areas in square miles and square kilometers? And also tell me how many people live in India, and what is the area code for Germany, France, and Italy?" Mohajer would keep on adding questions, but he runs out of breath. I'll spare you the minute-long response, but Hound answers every question. Correctly.

Hound, which is now in beta, is probably the fastest and most versatile voice recognition system unveiled thus far. It has an edge for now because it can do speech recognition and natural language processing simultaneously. But really, it's only a matter of time before other systems catch up.

After all, the underlying ingredients—what Kaplan calls the "gating technologies" necessary for a strong conversational interface—are all pretty much available now to whoever's buying. It's a classic story of technological convergence: Advances in processing power, speech recognition, mobile connectivity, cloud computing, and neural networks have all surged to a critical mass at roughly the same time. These tools are finally good enough, cheap enough, and accessible enough to make the conversational interface real—and ubiquitous.

But it's not just that conversational technology is finally possible to build. There's also a growing need for it. As more devices come online, particularly those without screens—your light fixtures, your smoke alarm—we need a way to interact with them that doesn't require buttons, menus, and icons.

At the same time, the world that



# Dream big, data.



**Big data analytics is the preferred fuel for growth.**

Today, every company's greatest strategic resource is its own untapped data. With HP, 100% of structured and unstructured data, including video and audio, can be used in real time to create real business insights that drive innovation, empower employees and surpass customer expectations.

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Jobs built with the GUI is reaching its natural limits. Our immensely powerful onscreen interfaces require every imaginable feature to be hand-coded, to have an icon or menu option. Think about Photoshop or Excel: Both are so massively capable that using them properly requires bushwhacking through a dense jungle of keyboard shortcuts, menu trees, and impossible-to-find toolbars. Good luck just sitting down and cropping a photo. “The GUI has topped out,” Kaplan says. “It’s so overloaded now.”

That’s where the booming market in virtual assistants comes in: to come to your rescue when you’re lost amid the seven windows, five toolbars, and 30 tabs open on your screen, and to act as a liaison between apps and devices that don’t usually talk to each other.

You may not engage heavily with virtual assistants right now, but you probably will soon. This fall a major leap forward for the conversational interface will be announced by the ding of a push notification on your smartphone. Once you’ve upgraded to iOS 9, Android 6, or Windows 10, you will, by design, find yourself spending less time inside apps and more chatting with Siri, Google Now, or Cortana. And soon, a billion-plus Facebook users will be able to open a chat window and ask M, a new smart assistant, for almost anything (using text—for now). These are no longer just supplementary ways to do things. They’re the best way, and in some cases the only way. (In Apple’s HomeKit system for the connected house, you make sure everything’s off and locked by saying, “Hey Siri, good night.”)

At least in the beginning, the idea behind these newly enhanced virtual assistants is that they will simplify the complex, multistep things we’re all tired of doing via drop-down menus, complicated workflows, and hopscotching from app to app. Your assistant will know every corner of every app on your phone and will glide between them at your spoken command. And with time, they will also get to know something else: you.

#### LET’S QUICKLY CLEAR

something up: Conversational tech isn’t going to kill the touchscreen or even the mouse and keyboard. If you’re a power user of your desktop computer, you’ll probably stay that way. (Although you might avail yourself more often of the ability to ask a virtual assistant things like “Where’s the crop tool, again?”)

But for certain groups of people, the rise of the conversational interface may offer a route to technological proficiency that largely bypasses the GUI. Very young people, for instance, are already skipping their keyboards and entering text through microphones. “They just don’t type,” says Thomas Gayno, cofounder and CEO of voice messaging app Cord. And elsewhere on the age spectrum, there are an enormous number of people for whom the graphical user interface never really worked in the first place. For the visually impaired, the elderly, and the otherwise technologically challenged, it has always been a little laughable to hear anyone describe a modern computer interface as “intuitive.”

Chris Maury learned this the hard way. In the summer of 2010, the then-24-year-old entrepreneur was crashing on a friend’s air mattress in Palo Alto and interning at a startup called ImageShack, having just dropped out of a PhD program

**We develop relationships with our digital assistants: Even when Cortana was unhelpful, people got attached to it.**

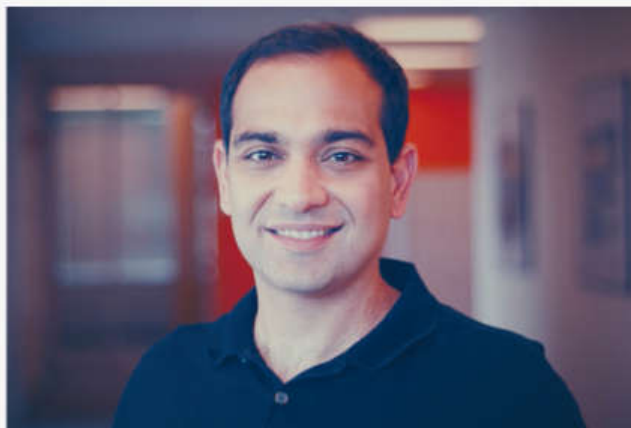
to chase the Silicon Valley dream. And in the midst of his long commutes and fiendishly late nights, he realized his prescription eyeglasses weren’t cutting it anymore. An ordinary optometrist appointment led to a diagnosis of Stargardt’s disease, a degenerative condition that doctors told him would eventually leave him legally blind.

Maury, who had every intention of staying in tech, was immediately forced to consider how he might use a computer without his vision. But for the 20-some million people in the US who can’t see, there’s only one real option for staying connected to computers: a 30-year-old technology called a screen reader.

To use one of these devices, you move a cursor around your screen using a keyboard, and the machine renders into speech whatever’s being selected—a long URL, a drop-down menu—at a mind-numbing robotic clip. Screen reader systems can cost thousands of dollars and require dozens of hours of training. “It takes sometimes two sessions before you can do a Google search,” Maury tells me. And as digital environments have gotten more and more complex, screen readers have only gotten harder to use. “They’re terrible,” Maury says.

As his vision started to go downhill, Maury immersed himself in Blind Twitter (yes, there’s Blind Twitter) and the accessibility movement. He came to realize how pissed off some visually impaired people were about the technology available to them. And at the same time, he was faintly aware that the potential ingredients for something better—an interface designed first for voice—were, at that moment, cropping up all over Silicon Valley.

So he set out to redeem technology for blind people. Maury founded a company, Conversant Labs, in the hope of building apps and services that put audio first. Conversant’s first product is an iPhone app called SayShopping, which offers a way to buy stuff from Target.com purely through speech. But Maury has much bigger designs. Conversant Labs is releasing a framework for adding conversational interaction to apps for iOS developers before the end of the year. And Maury wants to build a prototype soon of a fully voice-based computing



▲  
Keyvan Mohajer, CEO of SoundHound, has quietly built what is now probably the fastest voice recognition system around.



environment, as well as an interface that will use head movements to give commands. "That's all possible right now," he says. "It just needs to be built."

**ONE DAY IN THE FALL** of 2014, out of nowhere, Amazon announced a new product called the Echo, a cylindrical, talking black speaker topped with a ring of blue lights that glow when the device speaks. The gadget's persona is named Alexa. At the sound of its "wake word," the Echo uses something called far-field voice recognition to isolate the voice that is addressing it, even in a somewhat noisy room. And then it listens. The idea is that the Echo belongs in the middle of your living room, kitchen, or bedroom—and that you will speak to it for all sorts of things.

It's a funny thing, trying to make sense of a technology that has no built-in visual interface. There's not much to look at, nothing to poke around inside of, nothing to scroll through, and no clear boundaries on what it can do. The technology press was roundly puzzled by this "enigmatic" new product from Amazon. (At least one scribe compared the Echo to the mysterious black monolith from the beginning of *2001: A Space Odyssey*.)

When I started using Alexa late last year, I discovered it could tell me the weather, answer basic factual questions, create shopping lists that later appear in text on my smartphone, play music on command—nothing too transcendent. But Alexa quickly grew smarter and better. It got familiar with my voice, learned funnier jokes, and started being able to run multiple timers simultaneously (which is pretty handy when your cooking gets a little ambitious). In just the seven months between its initial beta launch and its public release in 2015, Alexa went from cute but infuriating to genuinely, consistently useful. I got to know it, and it got to know me.

This gets at a deeper truth about conversational tech: You only discover its capabilities in the course of a personal relationship with it. The big players in the industry all realize this and are trying to give their assistants the right balance of personality, charm, and respectful

distance—to make them, in short, likable. In developing Cortana, for instance, Microsoft brought in the videogame studio behind *Halo*—which inspired the name Cortana in the first place—to turn a disembodied voice into a kind of character. "That wittiness and that toughness come through," says Mike Calcagno, director of Cortana's engineering team. And they seem to have had the desired effect: Even in its early days, when Cortana was unreliable, unhelpful, and dumb, people got attached to it.

There's a strategic reason for this charm offensive. In their research, Microsoft, Nuance, and others have all come to the same conclusion: A great conversational agent is only fully useful when it's everywhere, when it can get to know you in multiple contexts—learning your habits, your likes and dislikes, your routine and schedule. The way to get there is to have your AI colonize as many apps and devices as possible.

To that end, Amazon, Google, Microsoft, Nuance, and SoundHound are all offering their conversational platform technology to developers everywhere. The companies know that you are liable to stick with the conversational agent that knows you best. So get ready to meet some new disembodied voices. Once you pick one, you might never break up.



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more than just  
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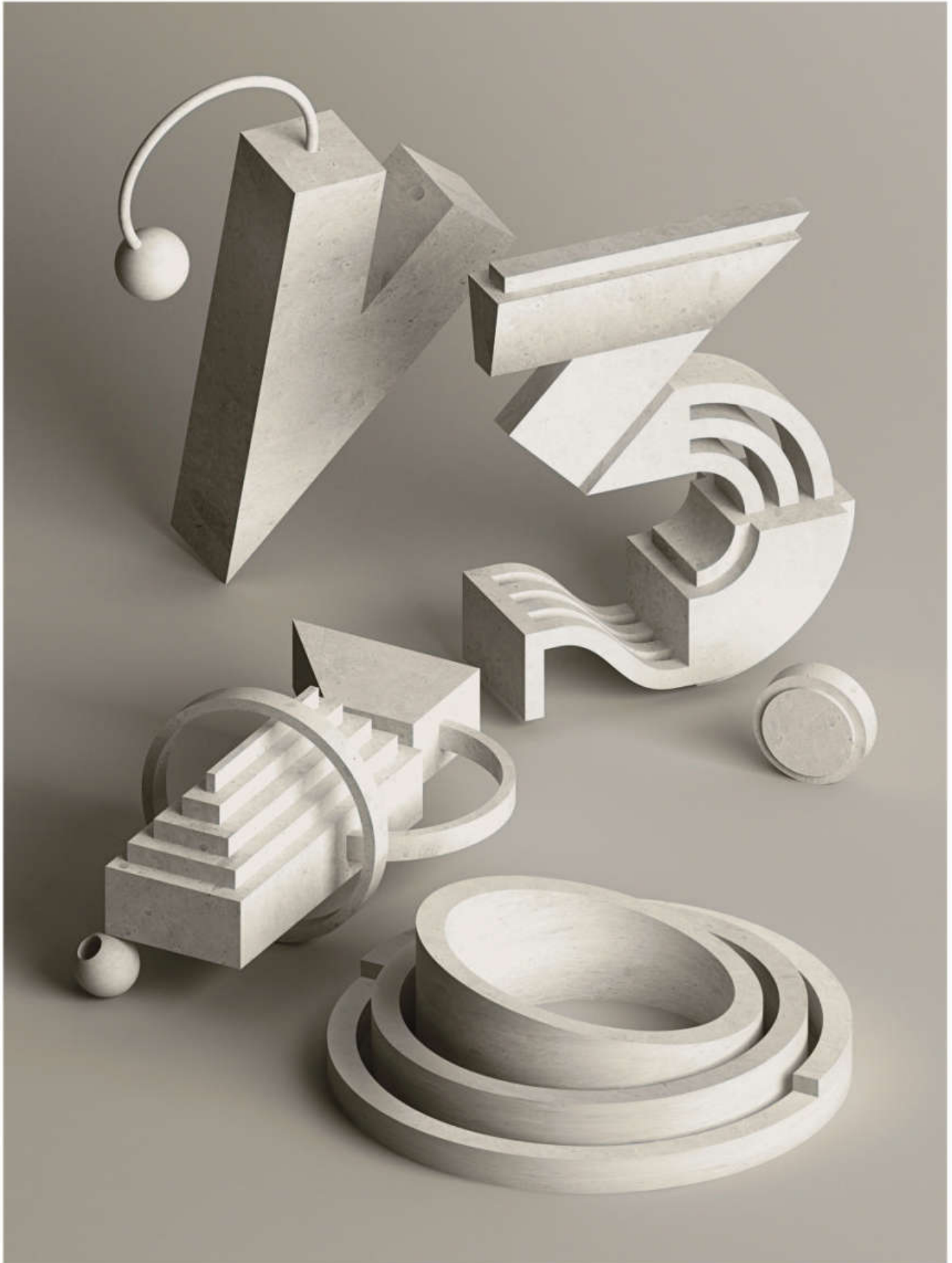


The new Premium Economy Class is designed for more you-room: wider seats, two armrests, an amenities kit and bottle of water. We've made more room for your luggage, too — by doubling your bag allowance. So take a sip of your complimentary welcome drink, tap for a movie on the 12" touchscreen and start enjoying your trip even more.



# Lufthansa





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CITIES BY





### CITIES USED TO GROW BY ACCIDENT.

Sure, the location usually made sense—someplace defensible, on a hill or an island, or somewhere near an extractable resource or the confluence of two transport routes. But what happened next was ad hoc. The peo-

ple who worked in the fort or the mines or the port or the warehouses needed places to eat, to sleep, to worship. Infrastructure threaded through the hustle and bustle—water, sewage, roads, trolleys, gas, electricity—in vast networks of improvisation. You can find planned exceptions: Alexandria, Roman colonial towns, certain districts in major Chinese cities, Haussmann's Paris. But for the most part it's happenstance, luck, and layering the new on top of the old.

At least, that's the way things worked for most of human history. But around

the second decade of the 20th century, things changed. Cities started to happen on purpose. Beginning with New York City's zoning laws in 1916, development began to occur by commission, not omission. Laws and regulations dictated the shape of the envelope. Functional decisions determined aesthetic outcomes—not always for the best.

So let's jump to now: A century, plus or minus, after human beings started putting their minds toward designing cities as a whole, things are getting good. High tech materials, sensor networks,

new science, and better data are all letting architects, designers, and planners work smarter and more precisely. Cities are getting more environmentally sound, more fun, and more beautiful. And just in time, because today more human beings live in cities than not.

In this year's design issue, we're telling the stories of some of those projects, from the detail of a new streetlight to a sacred city in flux, from masterful museums to infrastructure made for bikes (and the algorithms that run it all). The cities of tomorrow might still self-assemble haltingly, but done right, the process won't be accidental. A city shouldn't just happen anymore. Every block, every building, every brick represents innumerable decisions. Decide well, and cities are magic.

— ADAM ROGERS



HERE ARE  
EIGHT CITIES  
BUILDING  
THE URBAN  
FUTURE.

# Nº1

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## LOS ANGELES

UNITED STATES

OCT 2015

WIRED DESIGN

CITIES



TRANSPORTATION  
ARCHITECTURE  
CULTURE  
LIVABILITY  
PUBLIC UTILITIES

T A C L P

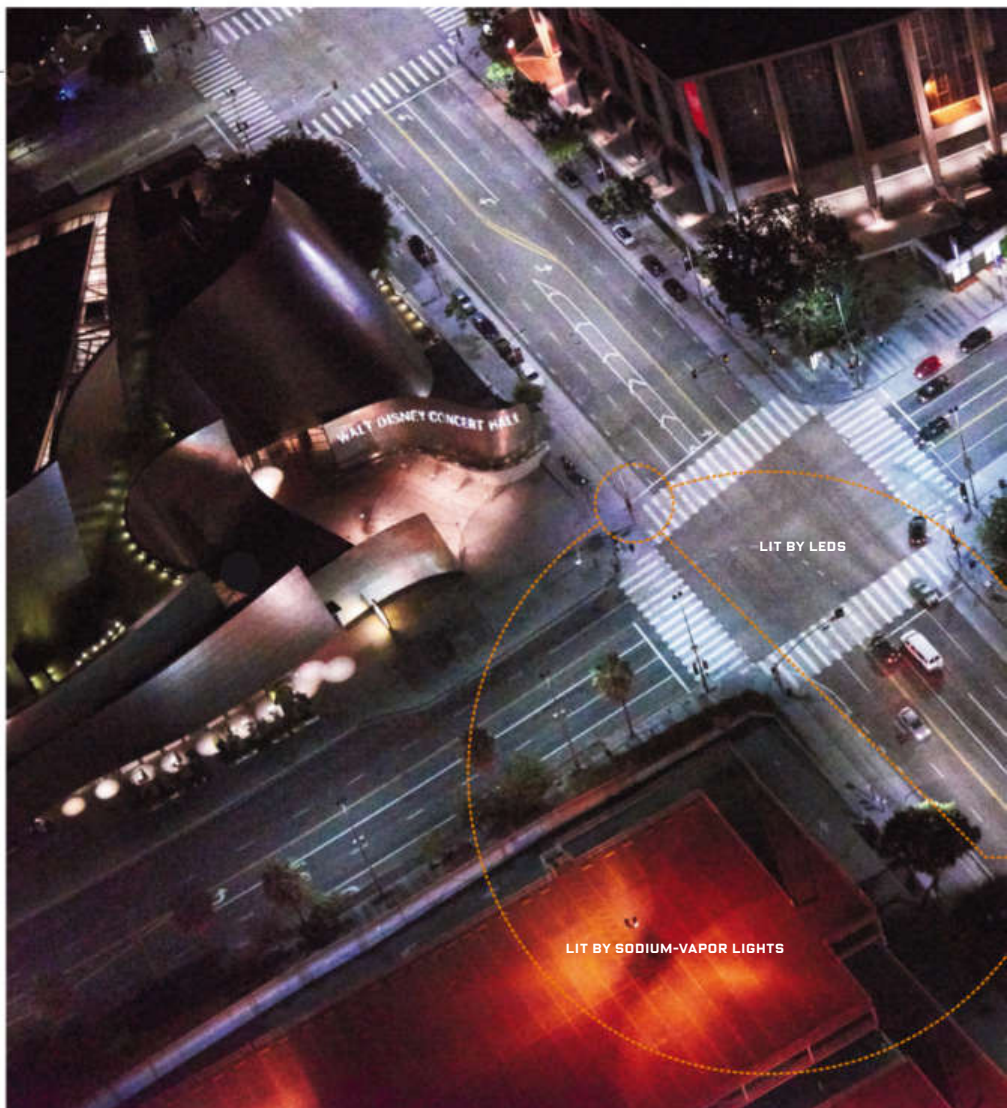
PROJECT DOMAINS

P

PUBLIC UTILITIES  
LEDS EVERYWHERE

### BRIGHTER LIGHTS, CONNECTED CITY

Los Angeles is retrofitting 4,500 miles of orange-yellow sodium-vapor streetlights with a moonlight-hued matrix of light-emitting diodes. Roads will look brighter, but they'll also be more connected. Every energy-efficient lamp will link wirelessly to the Bureau of Street Lighting, letting headquarters know if it is on, off, broken, etc. And in the future? Lights that change in response to what's going on around them. They might blink if a police car or ambulance is on its way or brighten for pedestrians after a ball game. While other cities around the world use LEDs to save money and add splashes of color and emphasis, LA plans to build a network that does more than show what's happening right in front of you. It tells you something about the entire city. —ADAM ROGERS



L

LIVABILITY  
LESS-THIRSTY LANDSCAPE

### THE RISE OF CALIFORNIA DRY

The palm trees along Hollywood Boulevard may be iconic, but native to LA they are not. And as California staggers through drought, landscape architects are replacing imported plants

and thirsty turf with native and drought-resistant flora. This new look—call it California Dry—is all about getting creative with textures and shapes. —LIZ STINSON

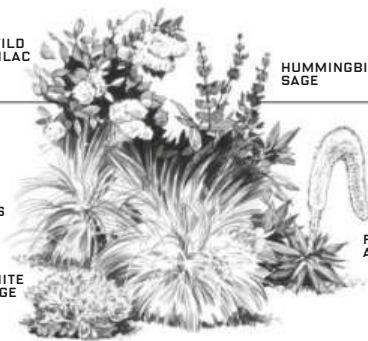
WILD  
LILAC

HUMMINGBIRD  
SAGE

DEER  
GRASS

WHITE  
SAGE

FOXTAIL  
AGAVE



SPENCER LOWELL





## TRANSPORTATION A FIRST-CLASS AIRPORT

### NOW BOARDING: CELEBRITIES AND OTHER ELITE FLIERS

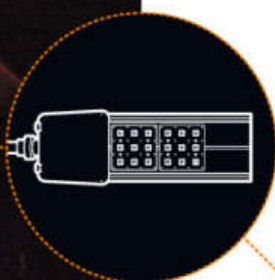
More than 70 million people passed through Los Angeles International Airport in 2014—a jet-lagged gauntlet of wheely bags and neck pillows. Now LAX is getting an upgrade, a more than \$8 billion overhaul of everything from concession

areas to moving walkways. Delta kicked in \$229 million to rework its Terminal 5. The revamp includes Delta One, a sort of airport within the airport that caters to celebrities and the wealthy. It presages a future where airports are less ad hoc, better organized, and not so dehumanizing. ¶ On arrival, a curbside attendant checks your name, velvet-rope style. Once you're checked in, it's off to a swanky lounge, one of the most pri-



vate spaces in the terminal. When it's time to board, Delta escorts take you up a private elevator and down a private corridor to the front of the line at a priority security checkpoint. ¶ On the way home you can opt for an express

exit with Delta's VIP Select service. You're chaperoned to the tarmac, then a hybrid Porsche zooms you across the airfield and onto Century Boulevard where, presumably, your driver will be waiting. —NATE BERG



MOST LAMPS  
HAVE ABOUT 10  
TO 20 DIODES.

## CULTURE THE MOBILE OPERA



### IN-CAR ENTERTAINMENT

To experience *Hopscotch*, an opera set in 24 limousines and SUVs driving around downtown LA, the audience will sit knee-to-knee with singers and musicians. Over the course of the show's run in October and November, the cars will drive three routes, tracking a story of the search for a lost love. Actors and dancers with wireless mics will perform on the sidewalk and in cars passing by, mixing with the ballet of everyday city life. ¶ "LA feels like the central character," says Yuval Sharon, artistic director of the industry, the opera company behind the production. Audience members—just 96 per performance—will also leave the cars and enter buildings and public spaces, with each walk or ride telling one of 36 chapters. You might want to attend more than once—any given audience member will see only eight chapters. —N.B.



**"THE GROUND  
UNDERNEATH  
POWER LINES IS  
ALMOST COMPLETELY  
UNUSED AND  
UNEXPLORED. WE  
SHOULD BE TALKING  
ABOUT HOW TO  
TRANSFORM THESE  
SPACES INTO  
OPPORTUNITIES  
FOR URBAN  
AGRICULTURE."**

—EMILY GABEL-LUDDY  
COFOUNDER, L.A.'S URBAN  
DESIGN STUDIO

#### Ditch the Grass

Green stuff is out in favor of decomposed granite or mulch. And rocky pathways, planters, and bridges add visual variety to a less verdant scene.

#### Build Structure With Succulents

Architectural plants like bold, pointy foxtail agave or the spiraling, stumpy echeveria will march along in organized rows.

#### Add Texture

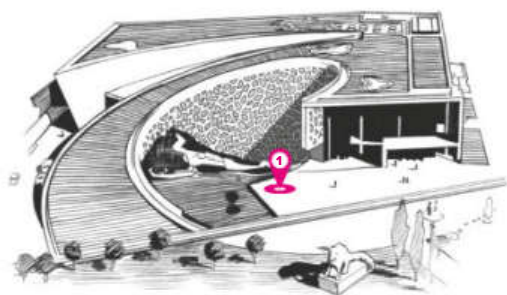
Poofy native plants add softness and color to all that rock and regimentation. It's a new kind of lushness—one LA probably should have had all along.



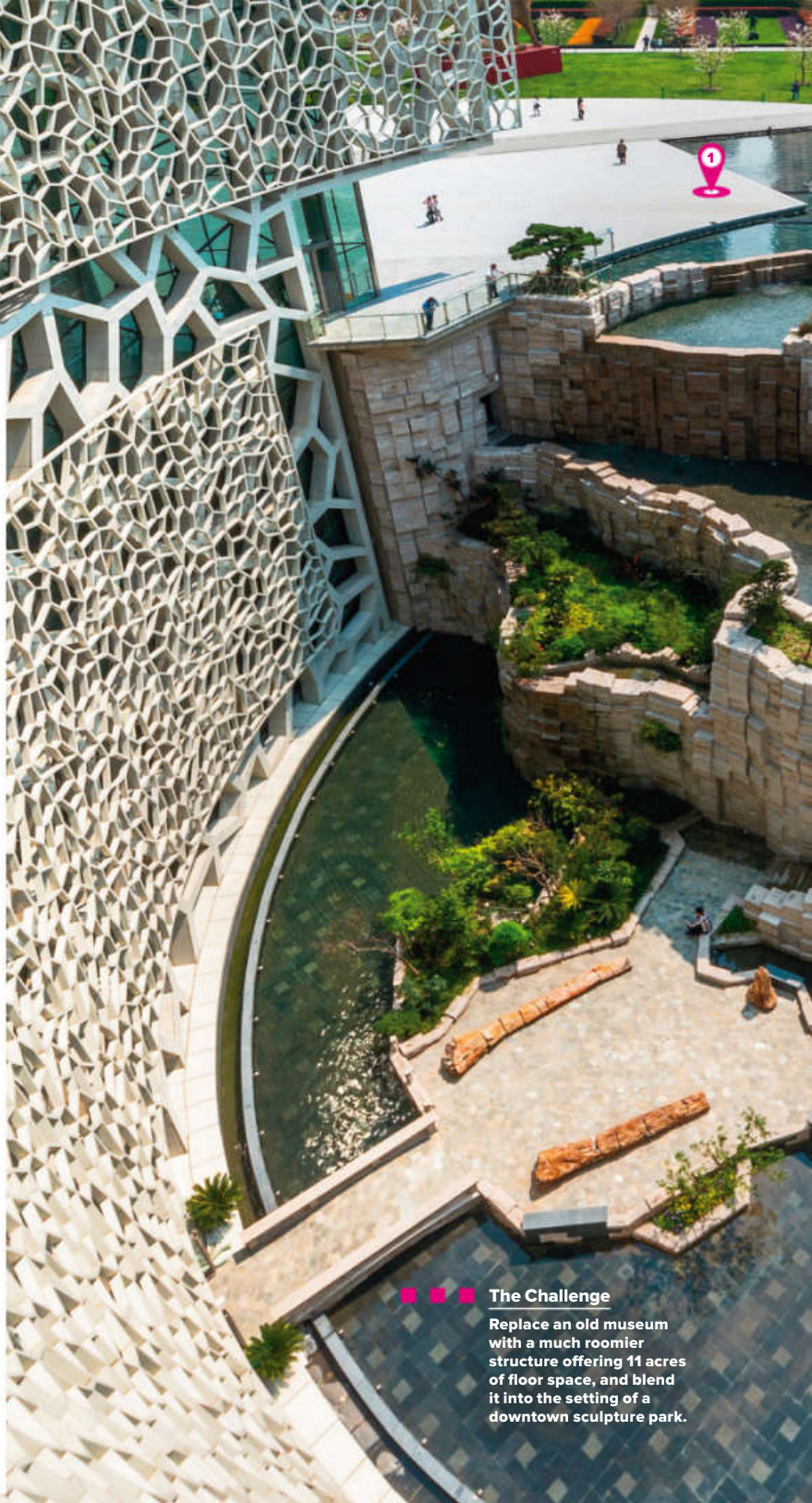


ARCHITECTURE  
AN EVOLVING MUSEUM

## THE SPIRAL LINE BETWEEN PAST AND PRESENT



Shanghai has exploded skyward in recent years, throwing up rank upon rank of bristling skyscrapers. Then there's the new Shanghai Natural History Museum. Set in a park near the Pudong financial district, the building spirals *down*, into the earth, like an excavation of the city's pre-urban roots. A central courtyard (shown at right) inspired by the water gardens of Suzhou is a reminder of the value that ancient Chinese culture placed on natural beauty. Around it, a honeycombed glass wall, evoking the cell structure of plants, fills the interior with sunlight. ¶ Architect Ralph Johnson of Perkins+Will says the shape of the building was inspired by the nautilus shell, but it's also for traffic control: Chinese museums are often thronged, and the descending ramps steer crowds through a chronological tour of life on Earth. On the way, they encounter some 11,000 specimens—including a towering *Mamenchisaurus* skeleton and later fauna that once thrived in Shanghai's vanishing wetlands. There's plenty of forward-looking tech too—like green climate and water systems. (That courtyard pool helps cool the building.) It's a thoroughly modern museum that embraces Shanghai's exuberant futurism while reminding its inhabitants of where we all came from. —VICTORIA TANG



### ■ ■ ■ The Challenge

Replace an old museum with a much roomier structure offering 11 acres of floor space, and blend it into the setting of a downtown sculpture park.

# Nº2

PAGE 098

## SHANGHAI

CHINA

OCT 2015

WIRED DESIGN

## CITIES

TRANSPORTATION  
ARCHITECTURE  
CULTURE  
LIVABILITY  
PUBLIC UTILITIES

T A C L P  
PROJECT DOMAINS





**DECISION: RAMP IT UP**

To integrate the structure into the landscape, the designers created a sloping, grass-covered roof that emerges out of the lawn.

**DECISION: CAPTURE THE SUN**

They wrapped the building around this sunken water garden to pull sunlight into the lower levels. Inside, walkways circle downward to channel crowd flow.

**DECISION: DIG DOWN**

Perkins+Will began by setting two-thirds of the building's mass below ground level.



# Nº3

## MEDELLÍN

COLOMBIA



TRANSPORTATION  
ARCHITECTURE  
CULTURE  
LIVABILITY  
PUBLIC UTILITIES

T A C L P

PROJECT DOMAINS

PAGE 100

OCT 2015

WIRED DESIGN

CITIES



TRANSPORTATION  
CABLE CAR CONNECTIONS

### GONDOLAS UNIFY A FRACTURED CITY

Medellín is nestled in a valley high in the Andes, and many of the city's poorest residents live in *comunas* they built on the steep slopes. During the '90s, drug gangs and guerrilla fighters controlled the narrow streets. As the violence waned and people started venturing out, they came up against another challenge: It was really hard to get anywhere. ¶ To knit together the fractured city, then-mayor Luis Pérez proposed a novel solution: cable cars. Rather than having to pick their way down perilous hillsides, people could hop in a gondola and soar to a metro station. The first Metrocable line opened in 2004 and was quickly followed by others. ¶ "The genius of the Metrocable is that it actually serves the poor and integrates them into the city, gives them access to jobs and other opportunities," says Julio Dávila, a Colombian urban planner at University College London. "Nobody had ever done that before." As people of all classes started using the cars to visit "bad" neighborhoods, they became invested in their city's fate, heralding a decade of some of the world's most innovative urban planning. —LIZZIE WADE





#### SHORTER COMMUTES

Residents who live in Medellín's hillside neighborhoods can now travel downtown in as little as 20 minutes.

#### SAFER STREETS

In areas with cable car access, crime has fallen dramatically. Two more lines will be completed within the next year.



#### LIVABILITY LIBRARIES AS PARKS

### SAFE SPACES FOR ALL



#### CULTURE ACTIVIST GRAFFITI

### FIGHTING BACK WITH SPRAY PAINT

Spray paint in hand, Daniel Felipe Quiceno, a.k.a. Perrograff, aims at the wall. "The lines of your signature need to be well defined," he tells the group gathered around him for a lesson in graffiti. With a practiced flourish, he creates a sharp swoop of blue. Then he hands out aerosol cans so his students can try making their own mark on Medellín. ¶ Since Perrograff started the Graffitiour three years ago, it has brought hundreds of visitors to the once-neglected streets of Comuna 13. That's where he grew up, amid terrible violence. To fight back, his cohort began transforming run-down corners of their town by covering them in murals that illustrate Comuna 13's history and that memorialize murdered friends; they also started planting community gardens. ¶ Grassroots efforts like the Graffitiour have been a vital part of Medellín's transforma-

The Metrocable succeeded in connecting Medellín's poorest neighborhoods to the rest of the city, but that wasn't enough for Alejandro Echeverri. As the city's director of urban projects from 2004 to 2008, the architect threw himself into tackling some of Medellín's most challenging urban problems. His secret

weapon? Beautiful design. But his efforts weren't aimed at the rich—Echeverri insisted on working in the same low-income areas the cable cars had opened up. "A good building, a well-designed space, a dignified public transit system, a quality cultural event—these all work on a psychological level to generate a feeling that you are included in the city," he says. That philosophy guided the design of five libraries sprinkled throughout Medellín, all surrounded by beautiful greenery. These "library-parks" were among the first safe public spaces many neighborhoods had ever seen. (After Echeverri's tenure

as director ended, the city built five more.) ¶ But Echeverri knew he couldn't just throw up nice buildings and expect life to improve. His department went street by street, planting trees and replacing crumbling schools. "One of the keys to Medellín's success is that these aren't isolated projects," Echeverri says. They're all woven together—cocreations, as he calls them—with the communities that use them every day. —L.W.



**"WHEN I RETURNED  
TO MEDELLÍN IN 2007,  
IT WAS LIKE  
DISCOVERING ANOTHER  
CITY. WITH THE  
METROCABLE AND THE  
NEW LIBRARY-PARKS,  
I STARTED TO VISIT  
PARTS I HAD NEVER BEEN  
TO BEFORE."**

—XIMENA COVALEDA  
BELTRÁN

COORDINATOR, EAFIT UNIVERSITY'S  
CENTER FOR URBAN  
AND ENVIRONMENTAL STUDIES

CORBIS (METROCABLE); PERROGRAFF (GRAFFITI); ALAMY (LIBRARY); ILLUSTRATIONS: JOE MCKENDRY



## ■ ■ ■ The Challenge

Separate bikes and cars at this busy intersection—and do it in a style befitting the entryway to one of Europe's most innovative cities.

### DECISION: THINK SMALL

To keep the ring small and maximize visibility for motorists, the designers opted for a floating deck suspended from a central pylon.

### DECISION: KEEP IT CLEAN

Running cables to the outer edge would have cluttered the look and crowded users. Solution: a separate, inner counterweight ring.

### DECISION: LIGHT THE WAY

The gap is spanned by dramatic light panels above and below, a salute to Eindhoven's history as the birthplace of Philips.

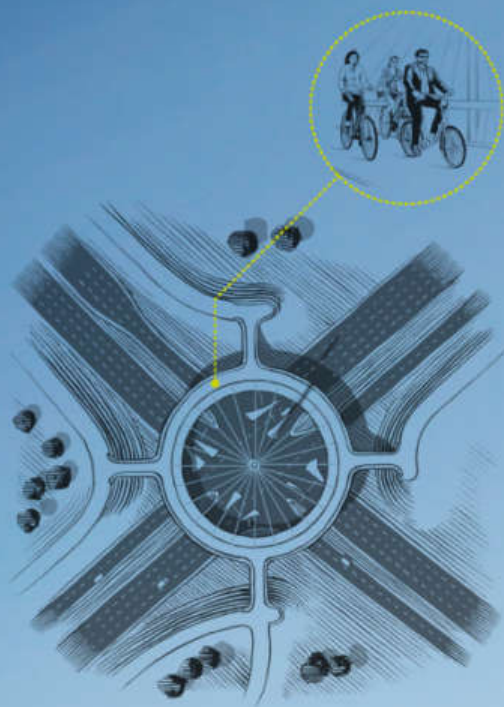




PEDAL OVER THE  
TRAFFIC JAM

## DECISION: BIKES ON TOP

To make it ideal for cyclists, ipv Delft proposed an elevated roundabout instead of a series of overpasses. It echoes the flying-saucer shape of a 1966 convention center down the road.



Eindhoven was a sleepy provincial town when a family named Philips began making light-bulbs there in 1891. Today it's a vibrant technology and research hub, where many workers commute in from sprawling suburbs. That makes for some busy intersections that aren't exactly bicycle-friendly. So as part of a planned network of dedicated bike roads, Eindhoven asked design firm ipv Delft to come up with a way for cyclists to fly over the stop-and-go. Completed in 2012, the \$8 million Hovenring is the rare piece of cycling infrastructure that isn't an afterthought—a green strip along-side parked cars or a bike symbol painted on a bus lane. The 1,000-ton steel deck is suspended by 24 cables from a towering space needle. Dressed up in LEDs, it looks ready to spin up and away into the northern sky. The city even lowered the roadbed below to keep the approach ramps at a nice, easy slope. The Hovenring is a joy for thousands of commuters who now pedal into and out of Eindhoven every day—and an emphatic statement by a city that knows where it's going. —ALEX DAVIES

Nº4

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EINDHOVEN

THE NETHERLANDS

OCT 2015

WIRED DESIGN

CITIES

TRANSPORTATION  
ARCHITECTURE  
CULTURE  
LIVABILITY  
PUBLIC UTILITIES

T A C L P

PROJECT DOMAINS

## OPTIMIZING THE HAJJ

For five days every year, the population of Saudi Arabia increases by 3 million. That's when Muslims visit Mecca for one of the religion's most sacred rites: the hajj. Most cities aren't built with that kind of surge capacity. So the Saudis have relied on the world's best architects and designers to keep millions of pilgrims safe, healthy, awed, and (a few of them) very, very comfortable—while honoring the tenets of Islam. —TIM DE CHANT

# Nº5

PAGE 104



### TRANSPORTATION A PURPOSE-BUILT AIRPORT

Inspired by traditional Bedouin tents, the 2.8-million-square-foot Hajj Terminal at King Abdulaziz International Airport has two massive cable-stayed, Teflon-coated fiberglass roofs. Passengers grab their luggage in the climate-

controlled section; natural ventilation in the open-air waiting area keeps temperatures around 80 degrees Fahrenheit, even while they hit a searing 120 outside. There pilgrims wait—sometimes up to 36 hours—for their ride to Mecca, 43 miles to the east. —T.D.

### THE ROUTE OF THE HAJJ

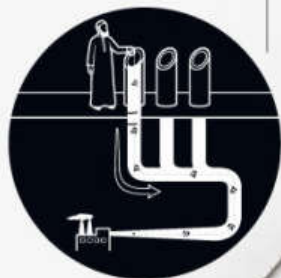


### PUBLIC UTILITIES PNEUMATIC TRASH COLLECTION

The \$20 billion—plus the Saudi government has spent on mosque improvements will solve at least one unholy problem: 600 tons of trash a day. It'll

disappear into 400 openings and get sucked at 40 mph through an underground network of pneumatic tubes to a station more than a mile away, where trucks will take it to a landfill.

—JULIETTE SPERTUS



3

The Great Mosque occupies more than 3 million square feet and continues to expand.



# MECCA

SAUDI ARABIA

OCT 2015

WIRED DESIGN

CITIES

TRANSPORTATION  
ARCHITECTURE  
CULTURE  
LIVABILITY  
PUBLIC UTILITIES

T A C L P

PROJECT DOMAINS



## LIVABILITY A FIBERGLASS TENT CITY

Most pilgrims spend nights in the Mina Valley—the hajj's midpoint—in a vast tent city. For decades the sandy plain was crammed with simple cotton tents, but a deadly fire in 1997 sent the Saudi government searching for a durable fire-proof replacement. Now an extensive

network of permanent hydrants helps protect more than 100,000 air-conditioned, semi-permanent structures of Teflon-coated fiberglass, each ranging from 250 to 850 square feet. And since close quarters can also aid the spread of illness, Mina has dedicated hospitals and ambulances too. —T.D.



The tent city for pilgrims even has its own paved roads.



Pilgrims throw pebbles collected at Muzdalifah onto the three elliptical pillars of the Jamarat Bridge.



**"THE CITY HAS BEEN PLANNING TO DEVELOP AWAY FROM THE MOSQUE BUT MAINTAIN A BEAUTIFUL CONNECTIVITY—LIKE EXTENDING ITS OUTSIDE PLAZA IN A DRAMATIC WAY THAT CAN ABSORB PEOPLE FROM EVERY DIRECTION."**

—AHMED AL-ALI  
COFOUNDER, X-ARCHITECTS



## ARCHITECTURE CROWD CONTROL

The Masjid al-Haram, the Great Mosque of Mecca, is an ever-expanding house of worship built around the holiest shrine in all of Islam—the cloth-draped granite cube known as the Kaaba. Pilgrims walk seven times counter-clockwise around the Kaaba twice on their hajj trip, and in recent years crowds have been so thick that they've forced people onto the mosque's roof. Architects from the firm Gensler took a cue from those rooftop pilgrims and proposed a series of eight-sided platforms surrounding the Kaaba. Upgrading the mosque has been a delicate bal-

ancing act, says Bill Hooper, head of Gensler's transportation practice. "We needed to keep them as close in to the Kaaba as we could but not compromise the emotional experience." The solution, Hooper says, will improve traffic flow, double capacity, and maintain sight lines. Buildings around the Masjid al-Haram have been received less fondly, though. Abraj Al-Bait is the least-likely second-tallest building in the world, dominated by a Big Ben–like central clock tower that looms 1,972 feet above the mosque. The hotel is augmented by a light show at night. —T.D.

## LIVABILITY A HOTEL FOR THE 0.01 PERCENT



Planned for completion in 2017, the Abraj Kudai will be the biggest hotel in the world—12 towers, 10,000 hotel rooms,

70 restaurants, four helipads, a shopping mall, and a bus station. Five floors are said to be reserved for the exclusive use of the Saudi royal family; the merely wealthy will have to make do with standard accommodations. It's a decidedly odd, neoclassic addition to the site. —T.D.



## ARCHITECTURE A BRIDGE TO BEAT THE DEVIL

Pilgrims come to the Jamarat Bridge on the third day of the hajj for the Stoning of the Devil—to throw seven pebbles at each of the three jamarat, pillars representing the three times Abraham refused the devil's challenges. Thousands of people throwing rocks over

one another's heads for several hours sounds dangerous, and before the new bridge, it was. In the '00s, hundreds of pilgrims were killed in stampedes. Architects built the area around the jamarat into a long five-level bridge so people could get better access to the pillars. And a handful of exit ramps can now help quickly clear the structure. —T.D.





THE PARLIAMENT HOUSE IS ONE OF NAIROBI'S ICONIC LANDMARKS.

### The Challenge

Provide riders of Nairobi's ad hoc minibus system with a useful map for getting from point A to point B.

#### DECISION:

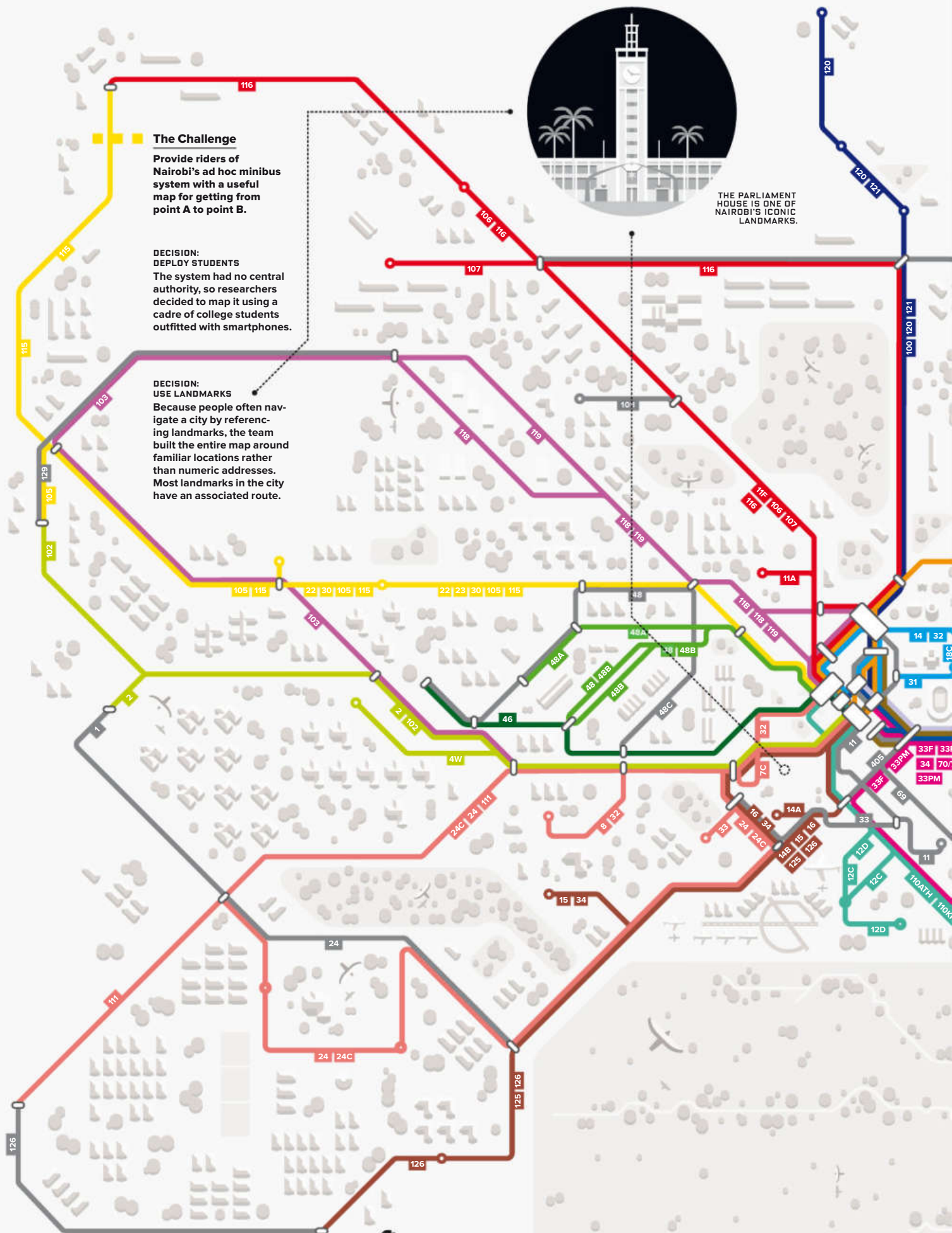
##### DEPLOY STUDENTS

The system had no central authority, so researchers decided to map it using a cadre of college students outfitted with smartphones.

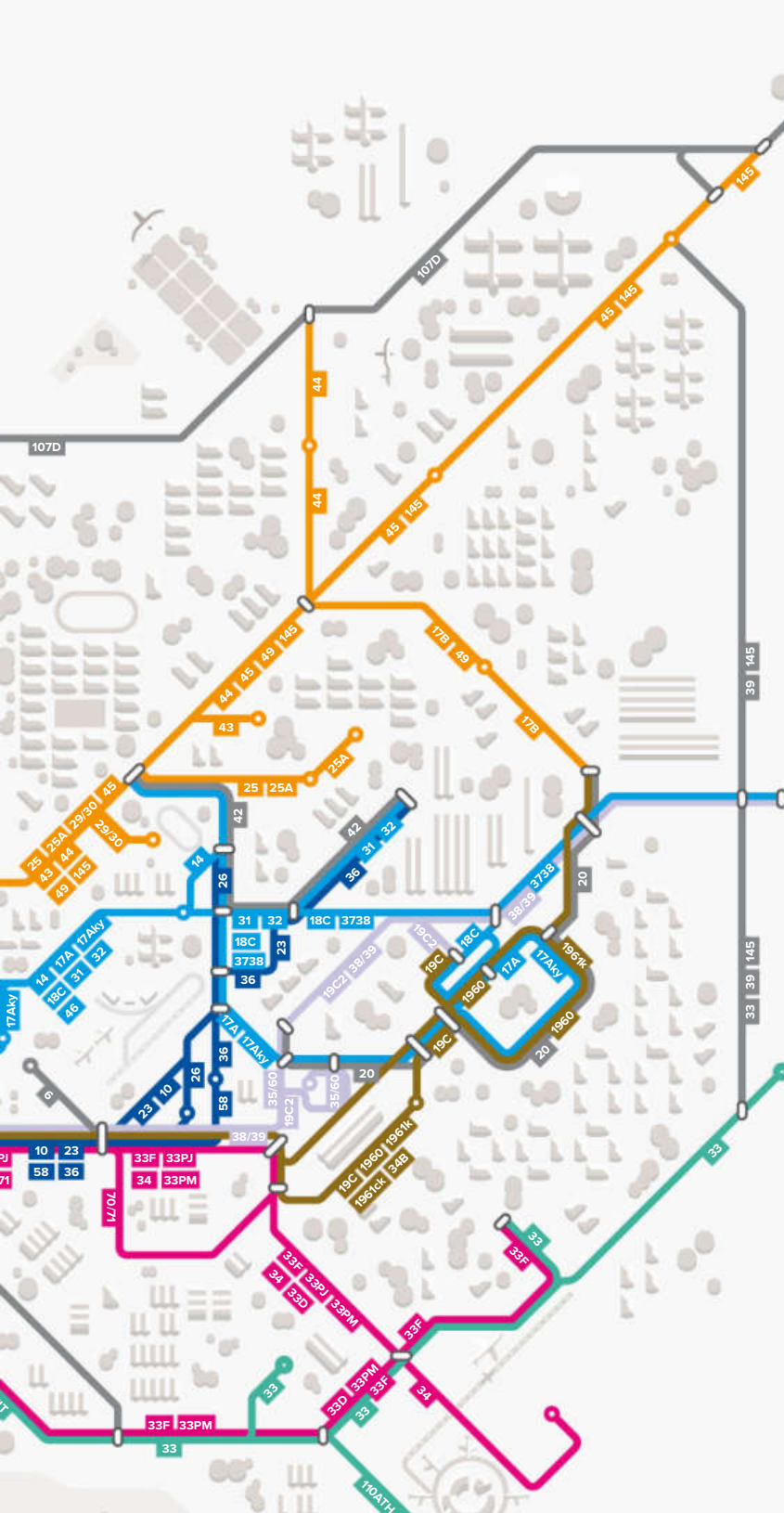
#### DECISION:

##### USE LANDMARKS

Because people often navigate a city by referencing landmarks, the team built the entire map around familiar locations rather than numeric addresses. Most landmarks in the city have an associated route.







**T** TRANSPORTATION  
A MAP FOR MINIBUSES



**A CHAOTIC NETWORK  
TAKES  
ORDERLY FORM**

Most people get around Nairobi in minibuses. Run by various entrepreneurs, the vehicles—called matatus—are cheap, plentiful, and known for loud music and sparkly disco balls. But schedules in this ad hoc network change at will, and finding the right route or stop is a crapshoot—a wrong decision can add hours to your trip. ¶ Enter a group of researchers and designers called Digital Matatus. It tasked local university students with riding the buses and using a smartphone app to track the routes and stops. When Digital Matatus released its subway-style map of more than 100 routes and major stops last year, people snatched them up. “Women, especially, said, ‘This is valuable, because at night I don’t want to get on the wrong matatu where I don’t feel safe,’” says Jacqueline Klopp, one of the project leads. ¶ But it gets even cooler: A few months ago, the Nairobi matatus became the first informal transit system on Google Maps. The move to a global platform legitimizes the zippy little vehicles and shows other cities how they too might harness these networks. Ultimately the goal is to strengthen the matatu system even further—fingers crossed it will still include a disco ball or two. —SHARA TONN

ANDREA KUENZIG/LAIF/REDUX; MAP COURTESY DIGITAL MATATUS

**Nº6** NAIROBI KENYA  
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TRANSPORTATION  
ARCHITECTURE  
CULTURE  
LIVABILITY  
PUBLIC UTILITIES  
**T A C L P**  
PROJECT DOMAINS

# Nº7

## SAN FRANCISCO

UNITED STATES

OCT 2015 | WIRED DESIGN | CITIES

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TRANSPORTATION  
ARCHITECTURE  
CULTURE  
LIVABILITY  
PUBLIC UTILITIES

T A C L P  
PROJECT DOMAINS

### Magali Charmot

ACCOUNT DIRECTOR  
SEEK

"The design of the space was a big factor for us. I had a few things I specifically knew I wanted—windows and a brick wall. What I love the most is when clients come in here, they say, 'Oh, it's so chic.' They feel it's *our* look and feel too."

### Eric Waisman

FOUNDER  
JAUNTY

"It's fun to get social with the other companies. There's creativity consistently. It's an attitude. In a corporate space, people automatically stiffen up. Here people are walking around with beer, or there are drones flying around."



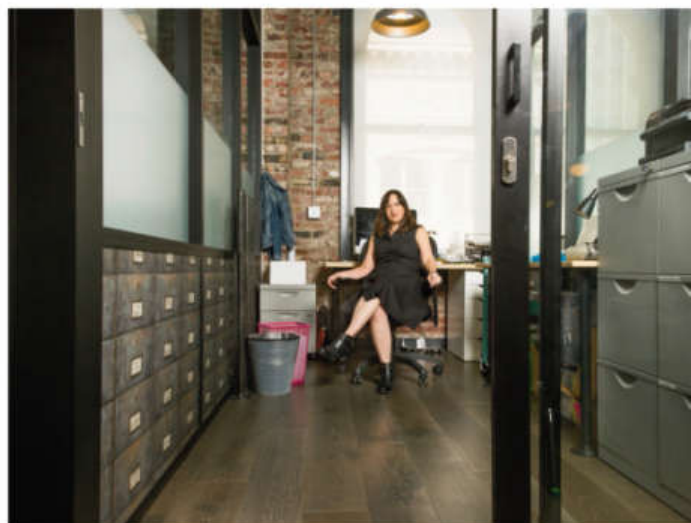
### MUCH MORE THAN A DESK AND A PHONE

Step into someone's "office" these days and it might not look like an office at all. People are working out of garages, cafés, the park. But for many startups and remote teams, it's still important to have a space to call their own. Enter WeWork, the biggest name in coworking. Founded in 2010, the company operates 44 coworking spots around the world. Not just open-floor plans and long desks, mind you—these are full-service *environments*, with well-designed communal areas, bright private rooms, and (of course) bottomless coffee. "Natural light and openness are the foundation," says WeWork cofounder Miguel McKelvey. "Beyond that, we try to bring a sort of eclectic spontaneity." It's working. The company is valued at \$10 billion and hosts thousands of workers. We visited its Golden Gate location, where nine people showed us around their—well, their space. —JULIA GREENBERG

### Susie McKinnon

ASSOCIATE DIRECTOR  
TENDERLOIN  
COMMUNITY BENEFIT  
DISTRICT

"The environment here really helps catalyze networking and collaboration. Other organizations run community meetings that we can attend. We see the work and projects that other folks are doing in the neighborhood."



### Ashley Crow

BUSINESS  
DEVELOPMENT  
MANAGER  
ABUSIX

"Everyone is smiling, happy, and innovative, which is the most unique part of working here. With so many windows, you get natural light, and you don't feel trapped. It's so different from being in a cubicle. You're in this open, inviting space."

### Luke McCormack

DIRECTOR, BUSINESS  
DEVELOPMENT  
FLIPPA

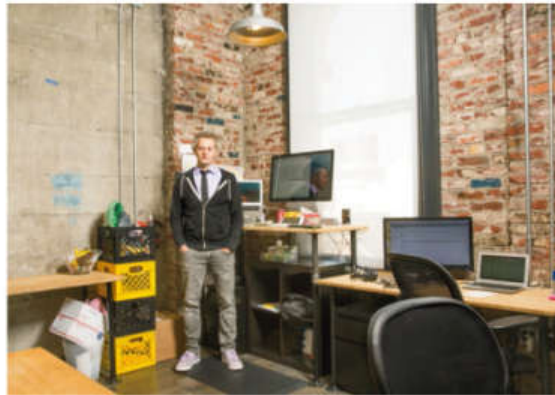
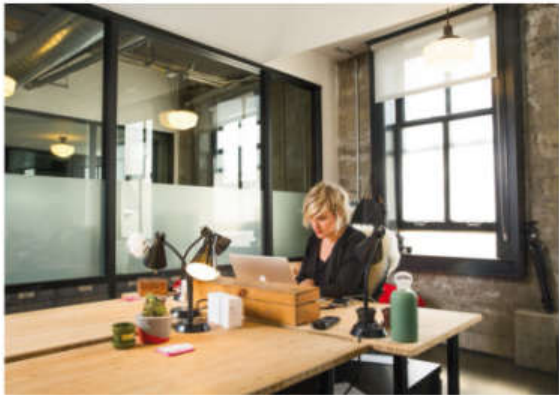
"You'll never see a handwritten sign here. The attention to detail is very high."



CHRISTIE HEMM KLOCK

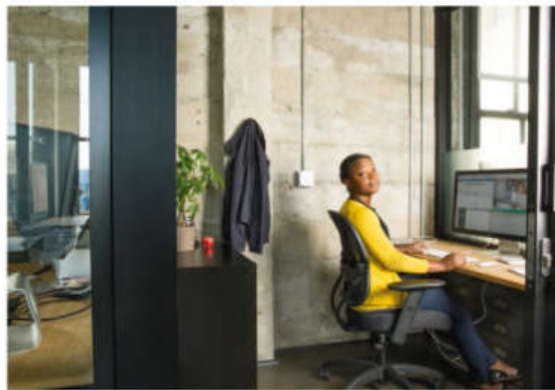
ILLUSTRATION: JOE MCKENDRY





**AJ Brustein**  
COFOUNDER & CEO  
WONOLD

"I don't want to waste my time focused on cleaning or stocking or getting the Internet man to come. When they say, 'Everything is taken care of, and you have clean bathrooms and coffee,' you don't have to worry about anything."



**Stefani Whylie**  
CEO  
SIMPLEKEEP

"I initially worked out of my home, but it was really hard to have a work-life balance. I realized I needed to find a new place to work. WeWork is not just an office space, it's a whole community of other people. It's a network."

"AS A BUILDING, GOLDEN GATE IS VERY NARROW, WHICH ALLOWS EACH OFFICE TO HAVE A WINDOW. THAT MIGHT SOUND SIMPLE, BUT YOU HAVE TO WORK HARD TO FIND THAT."

—MIGUEL MCKELVEY  
COFOUNDER, WEWORK



**Josiah Humphrey**  
COFOUNDER & CO-CEO  
APPSTER

"The tough thing about getting an office in San Francisco is you usually have to sign a lease with a two- or three-year minimum for like 30 grand a month. With WeWork, you pay more per square foot, but you have flexibility."



**Sara Roberts**  
FOUNDER & CEO  
ROBERTS GOLDEN  
CONSULTING

"A lot of my clients are saying, 'We want to act more like Silicon Valley.' Being embedded with all these start-ups is a fascinating draw for them. They come to my office and see how we work. It's almost like an incubator."







## ■ ■ ■ The Challenge

Eliminate traffic jams at a highway intersection that required coming to a full stop before merging onto a roundabout.

### DECISION: DON'T STOP

To let drivers maintain high speeds while changing direction, designers chose a turbine interchange, an evolution of the cloverleaf.

### DECISION: STAY LOW

A stacked interchange would have required up to six tiers of highway. The turbine needed just two, boosting aesthetics and lowering costs.

### DECISION: SPREAD OUT

Dubai has lots of land. Good thing, because turbines use a ton of it (this one is nearly a third of a mile wide). That would be a huge problem in dense US cities.



## TRANSPORTATION HIGH-SPEED INTERCHANGE

T

## WHERE DESIGN AND VELOCITY INTERSECT

Emirates Road used to be a nightmare. The only way to get off the then-six-lane highway and onto intersecting roads was a congested roundabout that required drivers to stop before merging into traffic. Finally, in 2006, city officials decided to restructure parts of the highway, starting with the dreaded roundabout. ¶ Rather than use a cloverleaf—the century-old grandfather of congestion remedies—they opted for a more modern configuration known as a turbine interchange. Devised in the UK in the 1960s, it allows drivers coming from four directions to engage in any turn or change of direction without slowing or weaving into traffic. Unlike stacked interchanges, which can involve four, five, or even six tiers of elevated highways, turbines require fewer levels, so the overall materials cost is much lower. “The turbine is high-speed and high-capacity,” says Gilbert Chlewicki, director of Advanced Transportation Solutions, a civil-engineering consultancy. “It’s the most efficient and practical solution.” ¶ Turbines use up a lot of land, but that’s not a problem in sprawling Dubai. So after two years and \$111 million, the Arabian Ranches Interchange opened in 2008, connecting Emirates Road (now known as Sheikh Mohammed Bin Zayed Road) with the Umm Suqeim and Al Qudra roads. The turbine is nearly a third of a mile wide, with 11 bridges extending a total of 1.5 miles. That sounds like a tangle, but rotational symmetry makes for a consistent driving experience from all four approaches. And in a nation that seems to pride itself on ornate displays of wealth, the simplicity isn’t so hard on the eyes, either. —IAN FRISCH

X

Nº8 DUBAI

UNITED ARAB EMIRATES

OCT 2015

WIRED DESIGN

CITIES

TRANSPORTATION  
ARCHITECTURE  
CULTURE  
LIVABILITY  
PUBLIC UTILITIES

T A C L P  
PROJECT DOMAINS

PAGE 111

BJARKE  
INGELS HAS  
BECOME A  
SUPERSTAR  
ARCHITECT.  
AND TWO  
WORLD TRADE  
CENTER IS  
HIS MOST  
EPIC PROJECT  
YET. BUT THE  
MISCHIEVOUS  
DANE IS JUST  
GETTING  
STARTED ON  
HIS QUEST TO  
TRANSFORM  
THE NEW YORK  
SKYLINE.

## **BIG** DEAL

BY  
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BY  
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WINTERS**













# ON A MISTY APRIL DAY, BJARKE INGELS

Previous spread: Bjarke Ingels front and center at the World Trade Center in New York City. Left: Ingels at the site of a proposed office complex for Google in Mountain View, California.

is standing on the roof of an old brick building, high above a cobblestoned street in Lower Manhattan, the collar of his black coat rakishly popped. The Danish architect is shooting a promotional film about the most important commission of his young career, his design for the skyscraper known as Two World Trade Center. It is still a work in progress, and his primary client—the imperious media magnate Rupert Murdoch—has yet to sign off. The hyper-eloquent 40-year-old isn't letting doubt stand in the way of his video introduction, though: He has obsessed over every line and image, telling his director that he wants viewers to swoon. At this moment, Murdoch's plan to relocate his companies is still one of New York real estate's biggest secrets. But Ingels can't wait to shout the news, quite literally, from the rooftops.

Between takes, Ingels points to a void in the densely packed Manhattan skyline, tracing the profile of a skyscraper that only he sees. From this perspective, Ingels' design resembles a stack of seven blocks, ascending like a staircase toward One World Trade Center, its monolithic neighbor. "In a way, it is almost like a physical manifestation of the spirit of America," he says. "Out of many, one." If completed, the tower will be among the tallest buildings in New York City, and the last of four envisioned in the master plan for the redeveloped World Trade Center. The ensemble will ring two cascading pools that pay tribute to the roughly 3,000 people who died in the terrorist attacks of September 11, 2001. Ingels is not preoccupied with that—he wants to make his own history. "The memorial is about the memorial," he tells me. "The tower should be about the living city."

Ingels is fond of saying that architecture is "the art of turning fiction into fact." He boasts many talents—as a draftsman, as a salesman, as the charming cultivator of his own winning image—but his greatest asset is a gift for storytelling: an ability to construct a narrative around practical necessities. Often his designs careen in fantastical directions. He is currently building a waste-to-energy plant in Copenhagen with a slanted roof that will serve as a recreational ski slope and a smokestack that will puff a symbolic ring of steam each time it emits a ton of carbon dioxide. For a proposed expansion of Google's campus in Mountain View, California, Ingels (along with collaborator Thomas Heatherwick) created a wildly elaborate complex of geodesic domes, envisioning a lifestyle of biking, hiking, and coding inside a sunlit glass terrarium. Such imaginative flights have made Ingels famous—and highly sought-after—at an age considered precocious by architecture standards. But fame can be a deceptive indicator in his profession: An architect's work, like the light of a star, only reaches the eye after a years-long journey.

Ingels' largest project to date, a striking pyramidal apartment building under construction along Manhattan's West Side Highway at 57th Street, is just about one-third the size of Two World Trade Center. "At the moment we are working seriously on one of the most daunting buildings in downtown New York," Ingels acknowledges, "we still haven't completed a skyscraper." With Two World Trade Center, Ingels thinks he has imagined a way to create a new kind of high-rise work environment, one that turns a form that is fundamentally vertical and hierarchical into a place for horizontal interaction. Now comes the laborious part: showing that he is capable of transforming that captivating story into hard facts on the ground.

To realize his design, Ingels has to continually prove its value to a pair of hard-nosed octogenarians: Murdoch and Larry Silverstein, the developer who has controlled much of the World Trade Center rebuilding. Murdoch and Silverstein still have to agree on a long-term lease, which would allow the \$4 billion skyscraper to be financed. "There's a lot of drama with the deal right now," Ingels says the day of the film shoot. "I don't know how worried I should be." Even if the parties come to an agreement, there will be other hazards to navigate: a volatile real estate market, the political melodrama inherent in building on a scene of mass murder, and an often irrational government, embodied by the Port Authority of New York and New Jersey, the lumbering transportation agency that owns the land beneath the Trade Center buildings.

For 14 years, these factors have conspired to keep the redevelopment process lurching along unpredictably, leveling many an architectural ambition. Ingels' design, in fact, displaced an earlier one by Lord Norman Foster. (Turnabout is fair play: Foster had similarly pushed aside Ingels on a previous project, a national library in Kazakhstan.) To avoid his predecessor's fate, Ingels will have to balance the sometimes conflicting demands of Murdoch and Silverstein, who will be marketing the top half of the building as office space. And he will have to do it while juggling all the other important clients who have recently showered business on his firm, which is impishly called BIG. (The initials stand for Bjarke Ingels Group, technically.) Ingels' dazzlingly swift rise has inspired much awe—and envy—among his peers. Just as one triumphant building can make an architect's reputation, though, it takes only one disaster to ruin it.

Ingels, never short on bravado, says he relishes the pressure. "It is like this Zen exercise," he says. "Turning the force of your enemy into your own strength."

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ANDREW RICE (@riceid) has written frequently about the World Trade Center development since 2001.



## THE FIRST FORCE INGELS

had to overcome at the World Trade Center was inertia. Silverstein thought he had a perfectly good design from Foster—who declined to comment for this article—and the developer had serious concerns about Ingels’ early drawings. He was scared the stacked structure would look asymmetrical—even teetering—from certain perspectives. “He just thought, like, could he see it fit in? No,” Ingels recalls. “Was it a nice design for another place? Maybe, but not here.” Silverstein almost rejected the entire deal, until an endorsement from the architects of other World Trade Center buildings changed his mind. But that day on the roof, Ingels confides that he has just heard that Rupert Murdoch wants to review the latest version of the design.

The following Monday, the principals all gathered in a conference room overlooking the site. Usually unflappable, Ingels was knocked off balance by the combative Australian’s rapid-fire questioning. “It’s almost sort of like kangaroo boxing,” Ingels says hours afterward, back at his office. Murdoch’s deepest concern, according to multiple sources, amounted to: Why doesn’t it fall over? With some assistance from David Childs, the courtly architect of One World Trade Center, Ingels explained to his client that the leaning effect is an illusion. The unorthodox stepped form of the building resulted from placing the inner core—which houses a high-rise’s crucial component, elevators—in an off-center position, which would produce expansive interior spaces for newsrooms, views of the Trade Center plaza from Fox News studios, and outdoor terraces. Murdoch was sold. “Before you get that story, most people suspect that it’s all just follies,” Ingels tells me. “The more blatantly the architect can explain why things are the way they are, the better.”

In his efforts, Ingels was able to count on at least one powerful ally: James Murdoch, Rupert’s son and corporate heir apparent. It was James, 42, who was the moving force behind the process of deciding whether to relocate his father’s companies, 21st Century Fox and News Corp., from an aging building near Rockefeller Center. “It was funny,” James says. “We sort of thought, ‘Let’s not hire a starchitect, let’s not build a big tower.’” He wanted to create an open, loftlike, creative workplace. But after an extended exploration of potential sites, he ended up at the World Trade Center. And with Ingels: a star, but one who understood his desires. “We were struck by what a great problem solver he was,” James says. “This is someone who can take a set of constraints and create something surprising and effective out of them.”

The foremost constraint involved Foster, or rather the remnants of his design. As the result of a political compromise between Silverstein and the Port Authority, Foster’s foundation had already been constructed to allow the completion of a \$4 billion underground transportation hub. The rest of the tower was to be built once Silverstein secured a major anchor tenant. But James didn’t think Foster’s stodgy skyscraper suited a media company’s needs. Ingels was similarly dismissive, calling the design “a generic extrusion with a flashy hat.”

Piggybacking a new skyscraper onto Foster’s foundation, however, created tricky structural problems, especially in the lobby and the lower floors, which would have to be engineered to shift the tower’s weight onto the preexisting supports. Whatever Ingels wanted to create high in the air would have to connect to what was already set deep in the ground. So, after winning over the developer and his anchor tenant, Ingels would have to convince yet another skeptical



BIG BJARKE INGELS GROUP (RENDERINGS)



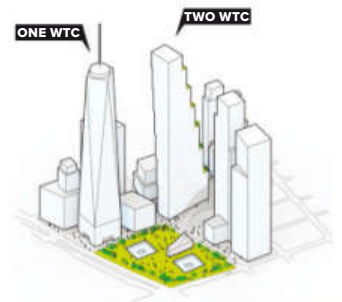
## TWO WORLD TRADE CENTER

The 80-plus-story building will be the final addition to the revitalized World

Trade Center, framing the 9/11 Memorial park alongside three other skyscrapers. From some perspectives, it will appear as though

the high-rise leans toward One WTC—a reference to the Twin Towers that formerly stood across the street from the site. The eastern

face takes a stepped form whose horizontal shape allows for expansive interior spaces and outdoor terraces.



# ECLECTICISM ON DEMAND

Ingels playfully calls his firm BIG, and his approach to architecture BIGamy. Rather than adhere to a single aesthetic, he tailors his ideas to meet client demands—all in service of designs unlike anything seen before. —LEXI PANDELL

## THE DRYLINE

WHERE  
**New York City**  
PROJECTED COMPLETION  
**2022**

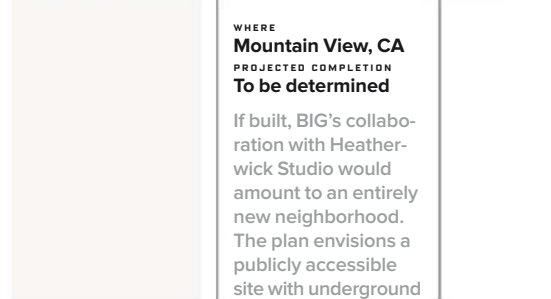
After Hurricane Sandy cost New York City \$19 billion in damaged property and lost revenue, BIG's design won a federal contest to address the city's structural and environmental vulnerabilities. It features a 10-mile waterfront park circling Lower Man-

hattan. The plan includes plenty of flood protection in the form of retractable walls, salt-resistant vegetation, and

berms that can block or survive surging water. But there are also public swimming pools, markets, and museums.



## GOOGLE NORTH BAYSHORE



WHERE  
**Mountain View, CA**  
PROJECTED COMPLETION  
**To be determined**

If built, BIG's collaboration with Heatherwick Studio would amount to an entirely new neighborhood. The plan envisions a publicly accessible site with underground

## AMAGER BAKKE INCINERATOR

WHERE  
**Copenhagen**  
PROJECTED COMPLETION  
**2017**

This waste-to-energy plant will incinerate trash to provide heat and electricity for local homes—and its roof will double as a ski slope. The plant will also have a smoke-stack that produces a ring of steam to symbolize whenever a ton of carbon dioxide is emitted by the plant, raising awareness of energy consumption.





## SMITHSONIAN INSTITUTION SOUTH MALL CAMPUS MASTER PLAN

WHERE  
**Washington, DC**  
PROJECTED COMPLETION  
**2035–2040**

The Smithsonian commissioned BIG to reimagine its south campus. BIG's plan includes museum expansion, more visitor services belowground, and

renovation of several historic buildings (including Smithsonian Castle). Some practical aspects of the project have an eye-catching twist: For example, fixing a leaky ceiling entails replanting a rooftop garden and adding a sloped entrance.



parking hidden beneath gardens, trails covered by solar canopies to produce green energy, and a public plaza. Google's offices would be housed beneath glass canopies that can be rearranged as needed for different functions.



audience: Silverstein's engineers. Ten days after Ingels' meeting with Murdoch, I return to BIG's offices, where everything is chaotic and half boxed; in a few days the firm is moving to a larger space. Ingels is in his usual state of chic dishevelment, his hair mussed, his face lightly browned with stubble. He digs up a marker and begins drawing on a whiteboard. "A lot of towers, as they get over a certain height, they tend toward a square footprint," Ingels explains. This generic form is dictated by cost, marketing—uniform floor plates are easier to lease—and engineering. A skyscraper must withstand huge forces of gravity and wind. But Ingels thinks he has figured out how to shape his skyscraper differently. "We just redistributed the calories," he says.

Ingels looks up from his board to see Ute Rinnebach, his project manager for Two World Trade Center, hurtle into the office. She is just back from meeting with the engineers.

"How did it go?" Ingels asks.

"Really bad," Rinnebach says. "I've got some horrible news for you."

Ingels' idea for retrofitting the foundation involved shoring up walls and columns underground, in the Port Authority's domain, which turns out to be verboten. Like a Jenga block, taking away that crucial bit of reinforcement could potentially cause the whole structural scheme to fall apart. Ingels darts across the office to consult computer models with his design team. As they start working out solutions, he goes into a meeting with a facade consultant, who delivers yet another crushing bit of news.

Ingels has some complicated ideas about how to vary the alignment of the tower's glass panes, along with the metal mullions that separate them. To bring down the price of the facade, which consultants said was running \$60 million more than Foster's, Ingels thought that he could use a thinner product for parts of the building. But the consultant informs him that New York Police Department security standards require all facades at the World Trade Center to be laminated safety glass, which makes them heavier. "I was like, fuck!" Ingels tells me later. "Because that's a piece of information that hadn't reached me. I just thought I had an ace up my sleeve, which I didn't, because the building has to be safe from explosions."

Silverstein and Murdoch have reached a tense juncture in their bargaining, and anything departing from rote formula is being assigned a premium in construction-cost estimates. "Right now," Ingels says, "the architecture is essentially held hostage."

For a few weeks, the fate of the project is very much in doubt. "It's trying to resolve all these issues without totally bastardizing the design," Ingels tells me one day in May. Walking briskly toward his Tribeca apartment, where he has to pack for a trip to Cannes, he says he recently received an impromptu visit from Silverstein. "He said, 'You know, this is a historical moment, we can make this happen. We need to make this deal happen, and to do that, we need to make the design happen. There are these outstanding issues, and you, my friend, are the one who can solve them.'"

The engineers were still fixated on the massing—the shape and size of the building.

"At some point, everybody gets a little nervous about the whole thing," Ingels says, "and drastic solutions go on the table."

Ingels thinks that he has averted disaster, for now, by agreeing to a number of painful structural changes. "I think it still sort of looks like itself," he says hopefully. We cut across the World Trade Center plaza, where the architect stops at the lobby window of Four World Trade Center—the sleek new tower designed by Fumihiko Maki—and admires its lobby sculpture, a 98-foot titanium arc. "It has no supports," Ingels says. "It just cantilevers like a motherfucker." At this moment, a group of Silverstein Properties exec-

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PIECE OF INFO  
THAT HADN'T  
REACHED ME—  
THE BUILDING  
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EXPLOSIONS."**

utives happens to walk by and relate the encouraging results of a meeting that morning. “I gotta tell you, I gotta give you a hug,” says Janno Lieber, Silverstein’s imposing second-in-command. “That was a helluva turnaround that you guys did in the last week.”

“Suddenly, the sum of a lot of nudges adds up,” Ingels replies.

As we walk away, Ingels says, “That was good, I got a hug from Janno.” Continuing around the site’s eastern perimeter, Ingels picks up our earlier conversation. “I really like this idea that architecture is the art and science of trying to make everybody happy,” he says. “Potentially, somewhere out there, there’s a design that can actually satisfy every dream, by being different.”

We pass the tourists photographing Santiago Calatrava’s outlandishly expensive transit hub, an infamous example of architecture without concessions. “In Darwinian evolution,” Ingels says, “the animal has two primary instincts, right? Fight or flight. And normally you would associate innovation with plowing through and fighting for your standpoint. But often in evolution it is the moment of *flight* where you are forced to go another route or climb into the tree. Or you’re the fish that escapes on land. You know, you discover new territory. In architecture, sometimes the eureka moment is actually when you give up a stance and say, OK, we have to try something else.”



#### THE EVOLUTIONARY METAPHOR

is an elegant rationalization of an unfortunate truth: An architect must live with continual defeats. In his 2009 manifesto, *Yes Is More*, Ingels wrote that “most architectural projects either miscarry or die in early infancy,” estimating that of 200 designs that he produced in his first eight years, only 11 were built. Fame has increased his odds, by allowing him to align himself with clients with money and powerful sway. Google, in particular, encouraged Ingels to let his imagination run wild. (When presented with one problem, involving parking, Ingels says, CEO Larry Page told him: “It’s nothing that \$50 million won’t solve.”) But then the city of Mountain View denied the development rights necessary to build the entire 2.5 million-square-foot complex. Even the world’s most important company sometimes gets told no.

Ingels says that press coverage of the setback was overblown; Google is still proceeding with at least one domed building. And there is more work coming BIG’s way every day. In Manhattan alone, Ingels is simultaneously designing four major additions to the Hudson River skyline and a \$335 million hybrid park and flood defense system known as the Dryline along the East River, offering a collective opportunity to leave an enormous personal imprint. In Washington, DC, he is working on a master plan for the South Mall campus of the Smithsonian. Each high-profile commission brings BIG to the attention of increasingly important clients—like the NFL franchise owner who recently retained Ingels to work on a stadium project. “Coming here to America five years ago, we were given the opportunity to try to reimagine the skyscraper, which is one of the great inventions of American architecture,” Ingels says. “I think the American football stadium would be an awesome thing to take on.”

Ingels founded BIG in Copenhagen only a decade ago. In architecture, where careers usually build slowly, through a steady accrual of critical appreciation, his rocketing trajectory has confounded expectations. “He has just bypassed all the rest of the avant-garde,” says Preston Scott Cohen, an acclaimed architect and professor at the Harvard School of Design, where Ingels has also taught. “No one has done it that fast, with that degree of success. You name them, he has just flown right over their heads.”

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ELSE.”**

Because of its complexity and expense—not to mention the egos of many of its practitioners—museum-grade architecture has long been limited to certain types of civic projects. Profit-driven office buildings have tended to be utilitarian, the domain of un inventive corporate firms. Ingels says he wants BIG to be “both pragmatic and utopian” and sees no reason why it can’t bring artistry to office complexes and stadiums—the kind of megaprojects that also reap gargantuan fees. “It’s a genre shift, because he’s almost a corporate architect at this point,” Cohen says. “But I don’t think those are his ambitions. He did not grow up in that culture.”

Ingels is a disciple of Rem Koolhaas, one of the greatest living theorists of architecture. He started his career with Koolhaas’ firm, OMA, in 1998. “From the very first time I met Bjarke as an intern, he was fearless,” says Joshua Prince-Ramus, another Koolhaas protégé, who was then working at OMA. “He does not fear putting his ideas on the table. On anyone’s table.” Ingels quickly tired of working for someone else, though, and struck out on his own. But the influence stuck. When he says the Manhattan skyline is “a raw agglomeration of evidence of commerce and finance and creativity and productivity,” that’s textbook Koolhaas. But while Koolhaas set out his ideas in a provocative treatise, *Delirious New York*, he has never built anything of note in the city. His student is seeking to make a more tangible mark. “Why is it that imaginative architects that do surprising and beautiful and thought-provoking stuff can’t do the really big buildings that matter?” Ingels wonders aloud in a rare moment of stillness as he sits with his legs thrown over the arm of a chair in his apartment.

The place is decorated with a pillowy couch of his own design and a road sign for Philip Johnson’s modernist Glass House in New Canaan, Connecticut. Ingels disdains the Modernists—blames them for turning the office building into “a boring box.” But he is fond of a famous Johnson quote: “I am a whore.”

“His strength and his weakness is that he is so promiscuous,” Ingels says. “Aesthetically and academically promiscuous.” He has coined a punning term, BIGamy, to describe his own up-for-anything style. He rejects the idea that an architect must adhere to a single personal aesthetic, which enables him to be cheerfully flexible in meeting the demands of corporate clients.

Ingels’ creative impulse to say yes to everything, even contradictions, often leads him into hybridism. His World Trade Center design is “Janus-faced,” he says, present-





## BIG'S NEW OFFICES

are on the top floor of an early-20th-century terra-cotta building on Broadway, not far from Wall Street. On their opening day, Ingels strolls jauntily, grinning as young architects of all nationalities arrange themselves at long desks in the spare loft space. "Where did all these people come from?" he shouts. (BIG now has 170 employees in New York and 100 in Copenhagen.) Ingels shows me to a window, which has a clear view north to the World Trade Center.

"So," Ingels says, "pretty epic."

*Epic* is one of Ingels' favorite adjectives. He does not often employ understatement, either in his designs or his personal enthusiasms. (While he was shooting a scene for his promo film, a pigeon flew over his shoulder and down the street behind him. "That's pretty epic!" Ingels exclaimed.) His aura of boyish delight proves useful in wooing clients. "You want to hire somebody in whose orbit you will enjoy being for the three, four, five years you're going to be working with them," says Mary Ann Tighe, a top executive at real estate brokerage CBRE, which represents the Murdochs. "He embodies that sense of promise: This is going to be great, this is going to be fun."

To welcome his staff to their new home, Ingels calls for a midmorning champagne toast. Someone plays Sinatra's "New York, New York," and then Ingels gives a speech. He rattles off a list of exciting projects, many of them not yet public, including a second Manhattan skyscraper. "It's not every day that you do a 1,200-foot tower in New York City," he quips. "But it feels like every day."

By early June, a tentative deal between Silverstein and Murdoch is in place, and although many provisions of the long-term lease are still in negotiation, the parties are confident enough to publicly unveil the design for Two World Trade Center. First, however, Ingels has to seek a final blessing from a fellow architect: Daniel Libeskind. Libeskind laid out the master plan for the new World Trade Center complex, and he also provides a cautionary example. A decade ago, he was, like Ingels today, the toast of New York, before he ran into the unforgiving realities of the development process—principally opposition from Silverstein. His hopes to play a lead role in designing One World Trade Center were thwarted amid public acrimony, though Libeskind's master plan remains the template for the whole site.

That conflict seems forgotten now, at least superficially, so one morning Silverstein executives join the two architects, both dressed all in black, for a presentation in BIG's conference room. On the table stands a large plastic replica of Two World Trade Center, glowing from within. Ingels takes care to show how the building respects one of Libeskind's beloved features, a plaza called the Wedge of Light, and displays a rendering of the lobby, where he intends to use an array of diagonal columns to solve the challenge of aligning his structural supports with predetermined points in Foster's foundation. "We get an almost Libeskind-esque language," he says, "defined simply by connecting the dots." He concludes with a courteous allusion to Libeskind's legacy.

"Here you really see the original vision from the master plan," he says, "realized in full."

Libeskind renders his verdict with a slap on the table. "Congratulations, that is a super building," he says. Then, with a touch of mischief, Libeskind turns to Janno Lieber. "I hope we're going to see it going up, Mr. Janno."

The initial reviews of Two World Trade Center's design after its unveiling on June 9 were mainly positive, but as Libeskind says when we talk later, that was the easy part. "Between that first smile and the last stone is the challenge of architecture," he says. To make the model real, Libeskind tells me, Ingels would have to find a way through "this complex space filled with what the city really is: economics, society, power brokers, politicians."

CONTINUE ON PAGE 134

ing a conservative front toward the memorial but a more adventuresome profile from other directions. His first big American commission, the apartment tower on 57th Street, is what he calls a "courtscraper," combining elements of a New York high-rise and a European courtyard building.

Douglas Durst, the property's owner, is a major New York developer and took a risky gamble in hiring Ingels in 2010, when he was still largely unknown in America. "Many architects, when they finish a design, they tell you, that's it, that's my design," Durst says. "He likes it when you give him a problem that has to get solved."

One hot summer day, Ingels trades his Velcro-fastened Acne sneakers for a pair of work boots and takes me up into the building, which will be called Via 57 West. We look down on the courtyard, which Ingels likes to note "has the same dimensions as Central Park, only 13,000 times smaller." Ingels has said it can be heartbreaking to see a building completed, because "all you see is the sum of the failures." But here he is sublimely satisfied.

"We lost a lot of battles here," he says. "That's why, in a way, you should really celebrate it as a miracle when something out of the ordinary happens."

# For the Love of Duke

How  
a lonely  
Appalachian  
woman  
met  
the man  
of her  
dreams  
online—  
and  
became  
a pawn  
in a  
global  
criminal  
scheme.

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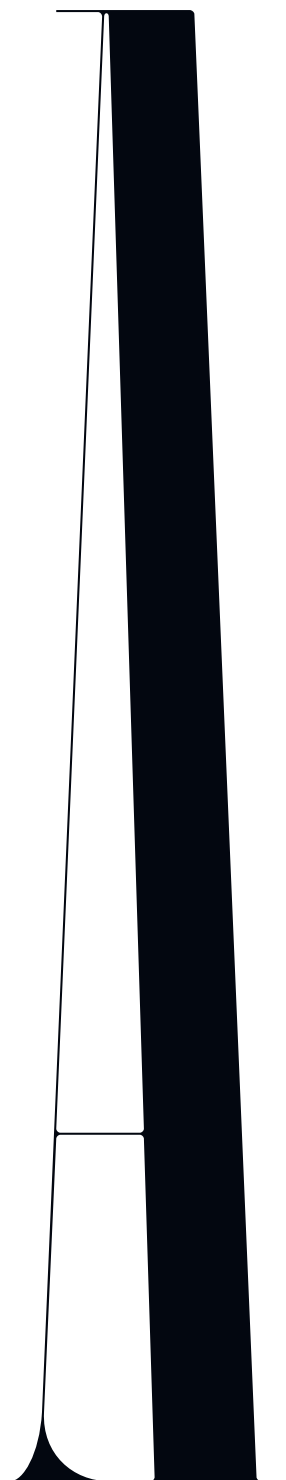




by  
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Illustrations  
by  
Steven  
Doyle





**Audrey Elaine Elrod** was in rough financial shape as the 2012 holiday season drew near. She'd been out of work for a year, ever since quitting her longtime clerical job at the county public health department

in Charlotte, North Carolina. The 45-year-old divorcee and junior-college dropout now lived in Bluefield, West Virginia, a fading town near the Appalachian coalfields where she'd been raised. In addition to collecting \$344 in unemployment benefits each week, Elrod made ends meet by hustling: She resold packages of discount toilet paper and peddled small quantities of prescription drugs. She scraped together just enough to rent a 676-square-foot garage apartment that she shared with a roommate, a gangly buffet cook a dozen years her junior.

On the Tuesday after Thanksgiving, Elrod opened a checking account at a First Community Bank branch located just across the state line in the twin town of Bluefield, Virginia. Despite her hand-to-mouth circumstances, Elrod's new account soon began to receive a series of sizable wire transfers, many of which originated abroad. Over the course of one December week, for example, almost \$30,000 arrived from Norway; on January 2, someone in France sent \$16,977. Elrod never let this money linger: She always showed up at the bank a few hours after a transfer cleared, to withdraw as much as \$9,500 in cash. She would then return on subsequent days to make additional four-figure withdrawals until the account was nearly empty.

As soon as Elrod would exit First Community with a bundle of \$50 and \$100 bills in her purse, she'd hang a right and walk across the parking lot to Ridgeview Plaza, a vast and featureless shopping mall surrounded by scraggly woods. She would pass by the drive-through tobacco outlet, the Dollar Tree, and Bellacino's Pizza & Grinders en route to the mall's centerpiece, a typically gargantuan Walmart. There she'd head straight for the store's MoneyCenter counter, where she used MoneyGram to transmit usually somewhere between \$1,500 and \$1,800 to a man she knew as Sinclair.

Elrod would spend the next few hours visiting other Bluefield establishments that offer MoneyGram or Western Union services: the Advance America payday loan store, the Food City supermarket, the austere cash-for-titles joint located literally under Route 460. At each stop she'd wire another chunk of

money to Sinclair. Sometimes, if her phone bill was due or her refrigerator was barren, she kept a few dollars for herself. But more often than not, she ended the day no richer than she'd started.

As she waited for the Bluefield Area Transit bus to whisk her back to West Virginia, Elrod would think about her fiancé, a Scottish oil worker she'd met online. She knew they'd soon spend hours gabbing on the phone, as was their daily habit. No matter how tired she got from helping Sinclair obtain his money, the prospect of hearing her fiancé's adoring voice always managed to lift her heart.



**Elrod's love affair** began with the sort of dodgy Facebook message that most people delete on sight. She discovered that message in March 2011, 20 months before opening her First Community account, while cleaning out her junk-strewn "Other" mailbox during a respite at a Charlotte mall. The missive caught her eye because of the sender's handsome profile photo, which showed a middle-aged man with a ruddy face, strong black eyebrows, and a welcoming gaze. His name was Duke Gregor.

"How beautiful is your picture Audrey," the message read. "My name is Duke, I am from Aberdeen do you know where? I am a Mechanical Engineer with Transocean. I have a son named Kevin and by the Grace of God I will meet that someone again."

*Contributing editor* **BRENDAN I. KOERNER** (@brendankoerner) wrote about skateboarder Rodney Mullen in issue 23.02.



"Any time I questioned anything, he had a comeback," says Elrod (below). "He could make you feel like the dumbest person in the world."

The typical Facebook user would likely recognize such a note as bait, but Elrod was in a place in her life that made her vulnerable to such flattery. She was in the midst of divorcing her husband of 14 years; his legal woes (including arrests for benefits fraud and making a false bomb report) had strained their marriage. Anxious about her future as an older single woman, Elrod lapped up the kind words about her looks—too few men seemed to appreciate her soft chin, wavy hair, and prominent brown eyes.

She wrote back, thanking the sender for complimenting her beauty and asking how he'd found her. He said he had stumbled across her profile while searching for a college friend who shared her last name; he also noted that his own surname was actually McGregor, not Gregor. After a bit more flirtatious back-and-forth on Facebook, Elrod invited him to continue their conversation on Yahoo Messenger.

Elrod and McGregor were soon chatting online for more than 12 hours a day. McGregor often talked about the agony of losing his wife, Susan, who he said had died in a car accident in Edinburgh in 2003. But he'd refused to let that tragedy destroy his *joie de vivre*, as evidenced by the many photographs he shared with Elrod: When he wasn't working on North Sea oil rigs, he enjoyed reading classic novels, playing with his tiger-striped tabby cat, and strumming a heart-shaped guitar.

McGregor was also a tremendous listener who never hesitated to lend Elrod a sympathetic ear. "He wasn't like the little boys I was used to dealing with—he was the opposite of that, so sincere, so caring," Elrod says. "It wasn't always about him, it was about me, about everyday stuff in my life." Within weeks of their initial Facebook encounter, Elrod was telling McGregor her most intimate secrets; he, in turn, was emailing her lists with titles like "100 Things We'll Do Together Before We Die." By the end of April 2011—only a month into their romance—they were discussing marriage.

As part of this blossoming relationship, Elrod grew close to McGregor's son, Kevin, a 17-year-old boarding school student in Manchester, UK. The boy wrote her bubbly

emails about his closest school chum and his plans for Senior Day. He also expressed a fervent desire to visit her in the US and perhaps even live with her full-time—a dream come true for Elrod, who lamented that she'd never had kids of her own.

Kevin scheduled a trip to Charlotte for his summer break, and Elrod sent him several hundred dollars to buy the plane ticket. But McGregor informed her that the sum ended up being too little because she hadn't accounted for the dollars-to-pounds exchange rate. "A few days after, I could tell there was concern in Duke's messages, there was a distance there," Elrod says. "It would take him a couple of minutes to reply. I could tell there was something wrong. And then he told me, 'I haven't heard from Kevin.'"

McGregor soon reported that he had located Kevin in a hospital outside Manchester, where the boy was recovering from a horrific car crash. The medical bills were piling up and he was in no position to pay them—he said his bank account had been frozen because he was on an oil rig. He begged Elrod to help "our son."

Once Elrod obliged by sending money, McGregor began to make more exorbitant demands. He asked for \$6,000 to buy a fancy new drill; she balked but eventu-

ally agreed to pay \$1,200 for a speedboat to deliver the equipment to McGregor's rig. Kevin, meanwhile, complained that he didn't have a computer, so he could only use the Internet at a train station café; she gave him the funds for a new PC.

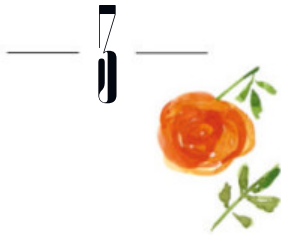
Elrod was puzzled by certain details in McGregor's appeals for aid—why, for example, did his bank freeze his account while he was at sea? But "any time I questioned anything, he had a comeback for it," she says. "He could make you feel like the dumbest person in the world. He made you feel like you didn't trust him, and if you didn't trust him, you didn't love him." If she obeyed McGregor without complaint, by contrast, he rewarded her with tokens of his love—early-morning texts that read "I'm thinking of how beautiful you are," Yahoo messages festooned with emoji of red roses.

By September 2011, Elrod was sending off three-quarters of her weekly take-home pay. She and her eight cats ate the cheapest food so the McGregors could have as much cash as possible. She sold her jewelry and her washing machine, then quit her \$19-an-hour administrative assistant job at the Mecklenburg County Health Department so she could liquidate her retirement account. But McGregor belittled her for not doing enough: He urged her to pawn her car title too.

Around this same time, he also introduced Elrod to a friend of his—a bank manager he'd met a decade earlier while working in the Gulf of Guinea. The man's name was Sinclair, and he lived in the Nigerian city of Warri, 250 miles southeast of Lagos. McGregor explained that Sinclair needed help completing a few transactions for clients who wanted to either conceal their assets or convert their local currencies to dollars. If Elrod could pick up some wire transfers in Charlotte and forward them to Warri, Sinclair would make sure that Kevin had ample funds to visit the US.

Elrod was skeptical upon hearing mention of Nigeria, a place she vaguely knew as a font of email scams involving bogus princes. But she decided to go ahead with the plan for Kevin's sake: "I thought of Kevin as my child; it was a mothering instinct. Whatever it takes to take care of Kevin, I'm going to do."





**This past March**, John F. Campbell, who commands American forces in Afghanistan, posted an unusual statement on his Facebook page, which normally features bland accounts of his official business. “I am happily married and my wife Ann is very much alive and my children do not need money for any medical procedures,” Campbell wrote. “I will NEVER ask you to send money ... I DO NOT use any dating sites, skype, google plus, yahoo messenger, or any other account.”

Campbell felt compelled to issue this disclaimer after the Army discovered more than 700 fake online profiles that purported to be the general: the handiwork of inventive and industrious criminals who specialize in fleecing the lovelorn. These Internet con artists, known as Yahoo Boys in Nigeria, often masquerade as American military officers who are deployed in war zones, a ruse that gives them plenty of unassailable excuses should a victim wish to meet face-to-face. The scammers are also fond of posing as oil workers who spend weeks at a time on deep-sea rigs, another macho cover story that allows them to fade in and out of victims’ lives at will.

Despite a slew of highly publicized warnings like the one made by Campbell, the romance-scam industry is flourishing as people become more accustomed to finding soul mates online. According to the Internet Crime Complaint Center, American victims of online romance scams lost more than \$87 million in 2014, compared with just \$50 million in 2011. In the UK, a 2012 study by researchers at the University of Leicester

and the University of Westminster estimated that 230,000 Britons had already been duped by Internet swindlers whose promises of love inevitably segue into demands for cash.

The victims of these scams often share a particular psychological trait: an exceptional faith in the existence and importance of romantic destiny. Psychologist Monica Whitty, a coauthor of the British study who specializes in romance-scam research, has found that although the people who get fooled by the Yahoo Boys are not necessarily lonelier or more trusting than their peers, they do tend to score highly on tests that measure how much they idealize romantic love. They are thus prone to fall fast and hard for anyone who showers them with exaggerated affection, even if that affection is expressed only via emails and instant messages.

Once a romance scammer has identified a vulnerable target, the trajectory of the ensuing crime is easy to predict. Each con begins with a grooming phase, during which a scammer tries to create an intimate bond with his mark: He will deluge the potential victim with plagiarized love poems and mawkish texts and gently encourage her to reveal dark memories from her past. Once the victim seems emotionally invested in the relationship, the scammer will ask for a small gift—just enough to buy a new laptop or cover a child’s tuition shortfall. If the victim complies, they’re soon hit with what Whitty terms “the Crisis,” a sob story designed to elicit a large and urgent contribution. A scammer who’s impersonating a soldier may say he needs money for an Afghan exit visa; an ersatz oil driller will claim that he’s trapped in a Kafkaesque foreign hospital. As Whitty noted in a 2013 *Security Journal* paper, victims often believe that using their money to allay the crisis will “lead to a reduction in the amount of time they have to wait until they finally meet [the scammer] face-to-face (which is ultimately the real prize for most of the victims).”

Those who are hoodwinked by the Crisis often keep shelling out money until they have nothing left to give, at which point the scammer will either vanish or gleefully reveal their deceit. “There are cases out

there that just break your heart,” says Steven Baker, director of the Federal Trade Commission’s Midwest Region, which has launched an initiative aimed at preventing online romance scams. “It’s not just the money that’s lost; it’s also emotionally devastating for the people involved. There have been suicides because of this.”

The criminals responsible for causing that devastation are seldom apprehended, since so many are based in West African countries where the authorities are often understaffed or corrupt. On a few recent occasions, scammers have been nabbed while ventur-

#### Love for Sale

**According to police who investigate online romantic cons, the scams follow a surprisingly consistent arc. Here’s how swindles typically unfold. —B.I.K.**

#### 1 The Bait

The scammers set up a fake profile on a social-media or dating site. The man they invent is a ruggedly handsome, middle-aged widower who yearns to

love again. He usually works in a macho job in a far-flung location—something that provides good excuses to avoid face-to-face meetings.

#### 2 The Grooming Phase

Once a woman gets drawn in, the scammer showers her with gestures of affection through email or instant messaging: declarations of love, plagiarized poems, compli-

ments on her beauty. The scammer also asks personal questions about the victim’s life—the key to establishing an intimate connection.



ing abroad. In August 2014, for example, a Nigerian citizen named Olayinka Ilumisa Sunmola was arrested at London's Heathrow Airport, nine months after a federal grand jury in Illinois indicted him for scamming at least 30 American women he met on eHarmony, Match.com, and MySpace. (Sunmola, who frequently posed as a US Army major, allegedly convinced one victim to perform sex acts that he secretly recorded and then used in an extortion scheme.) But romance scammers know they're unlikely to face legal peril as long as they stick close to home. Last year all of the cases pursued by Nigeria's

Economic and Financial Crimes Commission, which investigates public corruption as well as fraud, resulted in just 126 convictions—a negligible number in a nation of 174 million. (For comparison, nearly 7,900 Americans received federal sentences for fraud in 2013, with thousands more convicted at the state level.)

The Yahoo Boys' chief concern is not eluding arrest but rather figuring out how to transport their stolen money. Even the most naive potential victims now shy away from wiring funds to Nigeria, a country notorious as a hotbed of Internet chicanery. So scam-

mers have constructed elaborate networks of accomplices, colloquially known as money mules, in countries like the US that have good reputations for the rule of law.

In many instances, these accomplices were once victims themselves. "At first it might be people thinking, 'If I play ball, I can get some of my money back,'" says Ralph Gagliardi, a special agent with the Colorado Bureau of Investigation who has worked on several romance-scam cases. "But then they get turned by the lure of easy money." A prime example of how victims can transform into conspirators is the case of Karen and Tracy Vasseur, a mother-daughter duo from Brighton, Colorado. In 2009 the freshly divorced Tracy was conned by a Yahoo Boy who claimed to be a soldier in Afghanistan. On realizing she'd been deceived, Tracy volunteered to help her scammer by pretending to be an "agent" who specialized in relaying funds to American military personnel. She and her mother eventually pled guilty to participating in the theft of \$1.1 million from 374 victims in 41 countries; they were sentenced to a combined 31 years in prison.

The Vasseurs were not ideal partners for the scammers, however, because they demanded hefty fees for their services—as much as 10 percent of each incoming wire transfer. The Yahoo Boys prefer victims-turned-accomplices who are motivated not by greed but by romantic delusion.

### 3 The Gift

Satisfied that the mark is infatuated, the scammer concocts a situation that can be solved with a bit of money: He claims to need a

few hundred dollars for a visa or money to travel. If the victim agrees to provide the cash, the scammer knows she's on the hook.

### 4 The Crisis

Suddenly something goes horribly wrong. The scammer pleads for several thousand dollars to pay for a major surgery or to escape a

legal predicament. Afraid she'll never get to meet her beloved unless she complies, the victim wires the requested funds.



### 5

#### The Bleed

More aggressive demands for money ensue, until the victim either loses everything or gets wise to the con. At that point, the scammer either vanishes or tries to convince the victim to launder money on his behalf.

### 4



**Soon after she** started working for Sinclair, Audrey Elrod encountered signs that she might be part of a sprawling scam. On October 16, 2011, **CONTINUED ON PAGE 132**

If you'd like to have an in-depth discussion about algorithms or FaceTime, you should cross Aaron Sorkin off your list of potential conversation partners. But if you need an Oscar-winning screenwriter to elevate the tech world beyond the usual awkward-genius clichés, Sorkin is your man. ¶ Though he swears that he has no idea how he became Hollywood's "go-to guy for the binary system," in the past five years alone Sorkin has won an Oscar for writing David Fincher's *The Social Network*, earned a second nomination (alongside Steven Zaillian and Stan Chervin) for Bennett Miller's *Moneyball*, and churned out three seasons of the social-media-fueled *The Newsroom*. Now, with October's *Steve Jobs*, the 54-year-old is daring to go where several writers have gone before—it's the latest in at least a dozen films about the late Apple cofounder (and the third to be released this year). ¶ Staged as three distinct acts—each taking place backstage at a major product launch (the Macintosh in 1984, NeXT in 1988, and the iMac in 1998)—the film is an adaptation of Walter Isaacson's comprehensive (and Jobs-authorized) biography. But don't call it a biopic. "Walter's biography had to be about what happened," Sorkin says. "It had to be a piece of journalism. When I write something, there is actually a requirement to be subjective; it's really the difference between a photograph and a painting." And it's not always pretty. In a wide-ranging conversation, we spoke with Sorkin about finding the balance between real life and entertainment in taking on a 21st-century icon. ¶ **WIRED: How did your involvement in writing *Steve Jobs* begin?** SORKIN: I had just done *The Social Network* and *Moneyball* for Sony,

with Scott Rudin producing. Amy Pascal, who at the time was the co-chairperson at Sony, called and said, "We want you to adapt Walter Isaacson's book." I sort of immediately began shaking. Scott is very good at talking me into things when I'm nervous about doing them, and I said yes. ¶ **What made you so worried?** I'm nervous before I do anything. It's just standing at the bottom of a mountain and looking up with no clear path of how you're going to get to the top. But in this case, it was particularly daunting for me as I didn't know that much about Steve Jobs, and the idea of doing a biopic was daunting. ¶ **How did you get past that?** I work very slowly, and the first couple of months are spent just pacing around, climbing the walls, and saying, "I have no idea what I'm going to do. I don't know how to do this." It was in that period that I decided not to write a biopic. ¶ **Why not?** When you're doing a biopic, it's very hard to shake the cradle-to-grave structure that audiences are so familiar with. People are going to come into the theater knowing that first we're going to see a little boy with his father, and he's looking into the window of the electronics store, and then we're going to hit these famous signposts along the way in Steve Jobs' life. Also, I'm not really a screenwriter; I'm a playwright who pretends to be a screenwriter. I'm most com-

fortable writing in claustrophobic pieces of geography and periods of time. ¶ In reading about the trouble they were having getting the Mac to say "Hello" at the 1984 launch, I got this idea, and I wrote an email to Scott saying, "If I had no one to answer to, I would write this entire movie in three real-time scenes, and each one would take place backstage before a particular product launch. I would identify five or six conflicts in Steve's life and have those conflicts play themselves out in these scenes backstage—in places where they didn't take place."

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# One More Thing



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**You've worked with him enough by now, though, that I imagine you've got his trust.**

Really, I was emailing Scott to get help: Take this thing that I really want to do and tell me what I'm allowed to do, because no studio is going to let me do this. Two or three minutes later, I got an email from Amy Pascal—Scott had forwarded my email to her—and she said, “I think this is a great idea.” I couldn't believe it. They were going to let me do this thing. And so it turned into not a biopic. I'm not quite sure what to call it.

**Did the fact that this and *The Social Network* could be construed as being similar give you pause at all?**

Only the irony gave me pause—the irony being that I'm technologically illiterate. I'm not sure why I'm the go-to guy for the binary system, but I wasn't worried about repeating myself. I knew that it would be a different animal.

**In the first trailers for the film, you really get that “Steve Jobs, rock star” vibe.**

Of the big cheering crowd, yes. I was surprised, though, that there's actually not a lot of that in the movie itself. It all takes place backstage.

I think there are people anticipating that the movie's going to be just one big champagne toast to Steve Jobs. You saw it. It's not. **Walter Isaacson's biography is extremely comprehensive. How much did you rely on the text and the interviews in the book in crafting your script?**

Obviously Walter's book was invaluable. Also invaluable though was the time I spent with the actual people—with Steve Wozniak and Joanna Hoffman and several dozen others, but in particular with John Sculley and Steve's daughter Lisa.

**What surprised you most in reading the book and getting to know more about Jobs—the things that stuck out to you that you wanted to include?**

There were two things that I wanted to try to get my arms around. One had to do with Lisa.

I'm the father of a daughter too, and it was hard for me at first to get past Steve's treatment of his daughter—the denial of paternity and so forth. But what started out as this huge obstacle became a great engine for writing the movie, because Steve *would* find his way to being a father, which was great.

The other thing is what we hear Seth Rogen say in the trailer: “What do you do?” Where is the evidence of genius from Steve Jobs? There's the success, I get that, but I'm not getting what it is that Steve did. It was in talking to Lee Clow and Woz and Andy Hertzfeld and all these people that I began to get an idea of it. But I also liked that question being asked.

**Jobs was a big idea guy, but a lot of what we see in the film seems ego-driven.**

The book *Steve Jobs* is a masterful piece of journalism. A movie can't be that. *Charlie Wilson's War*, with Mike Nichols, was the first nonfiction that I wrote, and there was this thing that Mike would repeat to me: “Art isn't about what happened.” That sunk in.

**For as much as the movie is about one of the great tech icons, technology is really just a supporting character. You describe yourself as technologically illiterate, yet with this movie and *The Social Network* and *Moneyball*, you seem to ...**

This isn't an origin story or an invention story. It's not about how the Mac was invented. And *The Social Network* wasn't about the technology that went into creating Facebook. Nonetheless, I knew that there was going to be no way I could write this movie without a lot of tutors. There are lines that I wrote in the movie that I don't understand.

**There have been a number of other movies made about Steve Jobs, from *Pirates of Silicon Valley* to Alex Gibney's new documentary. Did you look at those movies at all to see what has already been done?**

I haven't seen *Pirates of Silicon Valley*. By design, I did not see *Jobs*, the Ashton Kutcher movie,

because I wanted to be able to say I haven't seen it. But I rely on people who have seen those films to tell me if I just wrote a scene that was in another movie.

**I don't know whether you've noticed that many of the headlines talking about *Steve Jobs* refer to it as “Aaron Sorkin's *Steve Jobs*.” Which is odd—and interesting—and must put some pressure on you.**

In reality, of course, the movie belongs to a lot of people. Like [director] Danny Boyle. In failure, certainly, I'm going to blame Michael Fassbender.

**Though he really is fantastic in the title role. Of course, it's quite public knowledge now that he wasn't the first actor cast in the role.**

The truth of the matter is that *Steve Jobs*, comparatively speaking, went off without a hitch. I know it doesn't seem that way, primarily because of the Sony hack and then news leaking that we were talking to Leonardo DiCaprio and we were talking to Christian Bale.

**As far as the Sony hack goes, you guys got off pretty easy—your movie certainly was not the main story there. But what does it feel like to wake up and learn that the whole of your communication about this movie you've been working on for years can now be read by anyone?**

The Sony hack was very troubling to me on a number of levels—I wrote about this in an op-ed for *The New York Times*. I couldn't get over the fact that news outlets were reprinting emails that had been stolen by extortionists who threatened the families of Sony employees. And to make matters worse, it happened to be North Korea.

**And to think it was all kicked off by a Seth Rogen comedy.**

Listen, if you were to tell me that Kim Jong-un was going to have a direct effect on my life, I wouldn't have believed you. But it happened. It really happened—while we were in the middle of casting *Steve Jobs*!



After nearly a decade in television, Sorkin headed back to movies in 2007 by adapting the nonfiction book *Charlie Wilson's War*. That biographical path led to an Oscar for 2010's *The Social Network*, which told the story of Facebook's tumultuous birth. The following year, he brought Michael Lewis' best seller *Moneyball* to the big screen, chronicling Billy Beane's data-driven efforts to turn the Oakland A's into champions. Next up? Only the biggest tech icon of our age: *Steve Jobs*.



# "If you were to tell me that Kim Jong-un was going to have a direct effect on my life, I wouldn't have believed you—but it happened. We watched the Sony hack unfold in real time while we were casting *Steve Jobs*."



■ ■ ■  
1 3 1

We'd be having casting sessions over at Sony, and one day everybody got this really weird thing on their computer screen, this sort of upsetting imagery of skulls and blood, and then the next day it got worse. And then we watched the whole thing unfold in real time.

**Did witnessing that change your habits? Are you sending more handwritten letters? Learning Morse code?**

I have a perhaps unhealthy stubborn streak in this area—I don't like altering my life because of bad people. But sometimes I won't be given the choice. When a movie is being rolled out, the studio publicists and all our individual publicists get together

and come up with bullet points and talking points—"Make sure you stay away from this," and "Don't say that quite that way, because that quote can be taken out of context," and that kind of thing. The decision was made that none of those conversations can happen by email. They all have to happen over the phone. So there are things like that.

The script itself was very heavily guarded. Once it was done, you had to go to Amy Pascal's or Scott Rudin's office to read it, and I'm talking about the heads of agencies—Ari Emanuel and Richard Lovett. An employee would be sitting in the room while they read it. There was just a lot of security around it.

**How curious are you about the audience response? The film doesn't necessarily paint Steve Jobs in the most flattering light, and not everyone is going to expect—or want—that.**

There are going to be people who say we were rough on him, and there are going to be people who say we weren't rough enough on him. But I think we made a good movie, and I think that if you asked 10 writers to write 10 movies about Steve Jobs, you'd get 10 different movies that wouldn't resemble one another. ■■

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**JENNIFER M. WOOD**

(@j\_m\_wood) is a freelance writer based in New York. This is her first piece for WIRED.





## For the Love of Duke

CONTINUED FROM PAGE 127

for example, she was instructed to visit a Walmart to collect \$600 that had been sent by a woman named Sheran Cohen, an elder-care consultant in Los Angeles.

Ten days later Cohen contacted Elrod on Facebook. "If this is a scam ... its not a threat its a promise i intend to follow it thru," Cohen wrote. "And if anything happens to mr b from his health, i will sue in kens behalf." The "Mr. B" that Cohen was referring to was Mike Benson, a dashing oil worker to whom she'd sent around \$14,000 over the preceding months. While allegedly traveling from London to Los Angeles for a long-promised visit, Mike called to say he was being detained in Charlotte because of a custody dispute involving his teenage son, Ken. The \$600 was supposed to be a down payment for his lawyer; Cohen had been directed to send the money to the lawyer's assistant, a woman named Audrey Elrod.

"If your beginning [sic] scammed so am I," replied Elrod, who denied knowing anything about a Mike or Ken Benson. "I only picked up and sent cos I was told that Sinclair would help my stepson ... I am told control numbers by a third party and forward to someone that is all I know."

Cohen filed a police report in Charlotte a few weeks later, accusing Elrod of fraud. But by that time, Elrod was on her way out of the city. Jobless and broke after having sent an estimated \$17,000 to Duke and Kevin McGregor, she had been evicted from her home and lost her car to repossession. She felt she had no choice but to give away her beloved cats and move back in with her mother, who lived in the mountains near Grundy, Virginia, an impoverished area known for its hulking coke ovens.

Decent cell phone reception was a rarity at her mother's rural home, so Elrod often hitched to the closest McDonald's to chat with McGregor. Despite all the misfortune she had endured since meeting her Scottish beau, she still felt they were meant to be together. She made her enduring faith the subject of a poem, entitled "Destiny," that she wrote for her fiancé:

I believe that our love is blessed and ordained by God. It is a union of two spirits destined for everlasting happiness. Thus, you have become the

knight and shining armor of my life. You offer me the joy of living, the peace of mind that comes from sharing and caring, and the shoulder to lean on.

Elrod's mother, Shirley Horn, was disturbed by the depth of her daughter's infatuation with McGregor, whom she recognized as a con artist. "I couldn't understand how she could not see this," she says. "But she lived and breathed him, calling his son her son and all of that stuff." Horn's patience finally wore out in June 2012, when Elrod tried to use her 17-year-old niece's USAA savings account to funnel money to Sinclair. After a heated argument, Elrod packed up her belongings and vowed never to return.

The newly homeless Elrod got a friend to drive her to Bluefield, West Virginia, a coal-boom relic filled with deserted industrial plants and derelict homes in danger of being reclaimed by the forest. There she rented a room in a menacing neighborhood known as Drug Alley, where one of her six housemates slept with a machete in his hand.

Despite this turmoil, Elrod never took a break from running errands for Sinclair. At first she hired people in Bluefield to drive her back and forth to Grundy, where she'd opened an account at Grundy National Bank; Sinclair had asked her to do so because he wanted her to receive larger transfers than either Western Union or MoneyGram allows. When that bank flagged her activity as suspicious and closed her account, she moved her business to a National Bank of Blacksburg branch in Bluefield, Virginia, just a few miles from her home. (The Bluefield on the West Virginia side of the border, the site of a Norfolk Southern rail yard, is the bigger and more decrepit of the twin towns.) The transfers that came into the new account ballooned in size—\$19,130 arrived on November 19, for example, followed by \$7,526 on the 20th. On Sinclair's orders, Elrod never withdrew more than \$9,900 at a time.

Wary of becoming a robbery target should anyone in Drug Alley get wise to her banking habits, Elrod moved to a garage apartment in a less ominous part of Bluefield—the place that she split with the buffet cook, whose name was Richard Ridalls. She paid for the upgrade through a combination of unemployment benefits and street entrepreneurship: Folks on College Avenue quickly learned that Audrey was a reliable source for cheap toilet paper and illicit pain pills, which she obtained from her own prescriptions and from desperate neighbors in need of quick cash. (She insists that she drew the line at selling "K4s," slang for Dilaudid.) She occasionally supplemented her income by pocketing bills from the bundles that she was transmitting to Nigeria.

Aside from rent and food, Elrod had two big expenses. One was the \$200 she sent to Kevin every Tuesday morning, right after her weekly unemployment check cleared. The other was her phone bill: She now spent hours a day talking to McGregor, reveling in the sweet

nothings he uttered in what sounded to her like a Scottish burr. (He refused to Skype, claiming that his computer was too old to use the service.) Her roommate, Ridalls, thought she was a fool—what kind of person, he wondered aloud, is always on the phone with some Scottish guy she's never met but has zero contact with her own family?

Oblivious to Ridalls' scorn, Elrod was busy devising ways to process vaster sums of money for Sinclair. In addition to becoming a customer at First Community Bank, where she received transfers of more than \$63,000 in the course of a month, she persuaded several acquaintances to give her access to their accounts. One such person was Hassan Alrumaih, a 26-year-old Saudi Arabian who was a friend of Ridalls and a student at Bluefield State College. "Hey I need to ask for your help," Elrod texted him in February 2013. "Sinclair wants to deposit a large amount and this would be a one time only and it's complete legal I swear." Elrod said the transaction would somehow allow her "son" Kevin to come to the States. When Alrumaih inquired about the source of the money, Elrod said it was from oil companies that were trying to reduce their tax liabilities. He agreed to allow more than \$130,000 to flow through his account at a BB&T branch.

On the morning of April 9, 2013, Elrod made her weekly visit to the Ridgeview Plaza Walmart to wire money to Kevin. A store security officer interrupted her transaction and escorted her to a back room, where she was made to wait until two men arrived: C. L. McCroskey, a local police detective, and William Puckett, a Russell County sheriff's investigator. They wished to interview Elrod as part of a Treasury Department investigation; they had been assigned to handle the matter because federal agents are few and far between in Southwest Virginia.

Elrod spoke candidly, albeit anxiously, about her relationships with McGregor and Sinclair. She made rambling statements about Kevin's stay in the English hospital, her initial hesitation to send money to Nigeria, and her reluctance to keep more than a trifling amount for herself. "Say I got \$2,000 and I'm sending out \$1,900, and after the fee and stuff say there is like \$30 left," she told the cops. "I'd keep the \$30."

Elrod also swore that she'd always stayed within the letter of the law—all she did was forward money that strangers had sent on their own volition. She took McCroskey and Puckett to her apartment and gave them a folder containing receipts from the transactions she'd conducted for Sinclair—proof, she thought, that she was blameless, for what kind of crook would keep such assiduous records? The investigators left without placing her under arrest.

Two days later was Kevin's supposed birthday, and Elrod sent him a loving email that gave no inkling of her legal predicament: "Happy Birthday my darling son. It's so hard to believe you are celebrating your third birthday in a row without your father and I, but even with the distance between us, our family is strong and together."



Two days after that, Elrod's spirits were raised by a gushy email from McGregor, who referred to her by the pet name Silly Girl: "Honey my Love. With you every minute spent is so amazing. Showing so much affection, clinging at each other. Having each moment as the best times of our lives with your love I could not ask for anything."

Those tender words were still fresh in Elrod's mind when, on April 15, she was arrested after a doctor's visit. She was taken to the federal courthouse in Abingdon, Virginia, where she was charged with the crime of structuring—that is, making multiple bank withdrawals of less than \$10,000 for the sole purpose of avoiding government scrutiny. (The Bank Secrecy Act requires domestic financial institutions to report all transactions larger than \$10,000.) Thanks to the Patriot Act of 2001, which stiffened the penalties for structuring with the aim of disrupting terrorist financing networks, Elrod was potentially facing decades in prison.

The months-long Treasury Department investigation into Elrod's labyrinthine dealings, which had apparently been launched after a tip from First Community, had identified dozens of victims around the globe. Many of these women told familiar stories: A mother of three in New Mexico had been conned out of \$8,000 by a Scottish-Irish oil worker named Duke Arthur, who said he needed money for his son's tuition. A Pennsylvania woman had sent Elrod \$900 so a guy she met online, Duke Gregor, could finish his job on an oil rig. A Texas divorcee had relayed more than \$15,000 to Nigeria as a favor for James Smith, a resident of Scotland whom she'd met on Christian-Mingle.com. One Norwegian woman had wired a total of \$116,169 to Elrod.

But the gravity of her situation seemed lost on Elrod. Within 24 hours of posting bond, she went right back to wiring money to Nigeria. In the eight days after her arrest, she sent nearly \$7,000 to associates of Sinclair.

When Elrod's probation officer learned of the continued money transfers to Nigeria in early May, Elrod's bond looked certain to be revoked. Her public defender, Brian Beck, counseled her to explain her actions to the court, on the off-chance that she might elicit sympathy and avoid being tossed in jail until trial. McGregor, on the other hand, encouraged her to flee, claiming that all he cared about was her personal safety.

There was never any doubt whose advice Elrod would heed.



**THE MONEY ELROD** used to abscond was provided by Sinclair: The banker wired a couple thousand dollars to Elrod's ex-husband, who FedExed a cashier's check to Bluefield. Elrod then caught a ride to the Charlotte area, where she rented a room in the town of Matthews.

McGregor vowed that he was finally going to

"come home" to visit her there, and that he would bring along the substantial nest egg he'd built after two years of constant oil-rig work. He spoke of the joy he would feel upon walking down the stairs at the Charlotte airport and seeing Elrod in the flesh for the first time.

But as the weeks went by and McGregor failed to finalize his travel plans, Elrod turned desperate. "Just come here and I'll turn myself in," she told him. "I don't care what happens to me then."

The last thing the Yahoo Boys behind the Duke McGregor character wanted was for Elrod to surrender, for she was still a valuable asset to their enterprise. She had convinced an acquaintance in Charlotte to use his Wells Fargo account as a landing spot for wire transfers, so victims' money kept flowing to Sinclair—the account received over \$94,000, most of which went to Nigeria via Western Union and MoneyGram.

As the summer of 2013 wore on, Elrod began to feel ill—there was a stabbing pain in her abdomen, but she feared arrest if she sought treatment. In the midst of her suffering, she received an email from McGregor that gave her pause. "Thank you for being the most loving and trusting person on Earth," one line read. Something about his use of the word *trusting* struck her as odd, as if he were mocking her rather than offering earnest praise. She spent days trying to compose a suitable response, an email in which she would declare that she was aware of McGregor's manipulative streak.

But Elrod never got the chance to send it. On August 29, US Marshals arrested her at her room in Matthews. She begged the agents to find someone to take the cat she had adopted while on the lam, to no avail. After appearing before a judge, Elrod used one of her jailhouse phone calls to contact McGregor. She explained that she was being sent back to Virginia and asked him to hire her a good lawyer.

The line went dead. And that was the end of Duke McGregor.



**THERE ARE MANY** theories as to why Elrod became so deeply committed to such an obvious sham. Randy Ramseyer, the assistant US attorney who prosecuted the case, characterizes her as a "pathetic individual" who was addicted to the positive feedback the Yahoo Boys provided. "It's clear to me that Ms. Elrod enjoyed the attention, enjoyed being necessary," he says. "They needed her, she knew that, and that's something that she valued."

Beck, Elrod's defense attorney, contends that his client's mindset was warped by her yen to become a mother and that she sincerely believed that doing Sinclair's bidding would somehow result in Kevin being sent to live with her. "In most instances, when criminals find out how big the thing is that they're involved

in, they want a bigger piece of the pie," Beck says. "She didn't want that, she didn't want a bigger piece. What she wanted was a son."

In Elrod's own account of her ruin, however, what's most striking is her lingering fondness for McGregor. Though he was the linchpin of a scheme that has caused her immense sorrow, Elrod treasures the moments of happiness he brought her—moments that she now understands were part of a manufactured illusion but that nonetheless occupy a special place in her heart. "I still think about his phone number. I still close my eyes and think about his emails," she told me in early April, at the West Virginia prison where she's serving a 52-month sentence after pleading guilty to structuring and conspiracy to commit wire fraud. "I can think of the messages he sent me, the little things he said to me, and it makes me smile. He was the only one I ever let get that close to me."

Elrod dabbed her eyes with a coarse brown paper towel as she spoke those words in her honeyed Appalachian drawl. Her graying forelocks and careworn face hinted at the hardships she's endured in prison: The abdominal pain she felt while on the run turned out to be a symptom of acute cholecystitis, which led to the removal of her gallbladder and a near-fatal case of sepsis. Her skin now has a sallow hue that makes her streaks of purple eyeshadow seem all the more vivid.

Though she acknowledges that she deserves some punishment, Elrod insists that the government "didn't have to do me as harsh as they did." She feels particularly burdened by the restitution she's been ordered to pay—\$413,790.91 to 28 of the scam victims who've been identified. Given that she's currently earning 12 cents an hour at her prison job, the debt seems insurmountable.

The criminals who flipped Elrod from victim to accomplice, by contrast, have vanished. Ramseyer says he is unaware of any efforts to catch the scammers in Warri, and Nigeria's Economic and Financial Crimes Commission, which did not respond to repeated inquiries, has posted no news of any arrests. (The media-savvy EFCC is usually effusive on the rare occasions that it busts romance scammers; the organization crowed quite a bit in January, for example, when it managed to recover \$2,000 that a Texas woman had lost.) The phone numbers used by McGregor and Sinclair are no longer receiving calls.

Toward the end of our conversation, I asked Elrod what she would say to McGregor—or, rather, the Yahoo Boy who played McGregor—if she were given the opportunity. She chewed nervously on her right index finger as she confessed that she has many, many questions for the man. But the first one she mentioned was not how he faked his Scottish accent or what became of her life savings or how many other women he was stringing along while they were "engaged." The question at the forefront of her mind was something far more basic: "Was it always a scam?" ■



## Big Deal

CONTINUED FROM PAGE 121

Many elements of the tower's design are still in flux. For a while, it lost one of its seven boxes, and then it got it back—but the height of the building shrank by 90 feet. And the tower has acquired one inconvenient critic: Douglas Durst, who happens to operate One World Trade Center next door. "I'm very disappointed in Bjarke's design," the developer tells me, explaining that he dislikes the orientation of its stepped gardens. "He turned his back on our building. Not even metaphorically. It's very disrespectful."

Durst also says he still thinks Ingels is a genius. A cynic might say the developer has an interest in minimizing competition as he attempts to lease his own World Trade Center building. (The anchor tenant is Condé Nast, the parent company of WIRED.) But Durst's dissatisfaction illustrates a danger embedded in Ingels' promiscuous success. Every client expects monogamous attention, and it's not always possible to satisfy every dream.

It isn't hard to see the question on the horizon. Can BIG keep getting bigger without losing its appealing spark? One competitor told me that architects around New York have been asking, "Is there anything he's turning down?"

**AS BIG HAS EXPANDED**, Ingels has necessarily taken on the role of brand ambassador and delegated much authority to his 12 partners—including the company CEO, who used to work for McKinsey—and a talented staff of junior architects. But BIG is still a highly personalized operation. In mid-July, Ingels returns to the New York office from Europe to find all kinds of crises awaiting his intervention. There is an issue with the concrete he plans to use for the facade of a residential building. "Oh, that looks horrible," he says, recoiling from a photo. There is an issue with a client, a tech executive building a house in the Palo Alto hills, who isn't sold on Ingels' preferred cross-shaped concept. "Just to do, like, another landscape-integrated house," Ingels sighs, "maybe is not so fun."

Then Ingels whirls off to a meeting in Brooklyn about a waterfront park pavilion. He tells me BIG's design, which his staff calls the Dorito, has engineering issues. So he's going to pitch a newly brainstormed concept: the Watchflower. He holds a plastic model of the pavilion that

looks like a carnation on a stem. "It's going to sail from Holland on a barge," he says, "and then we're going to plant it like this." He jabs the stem downward.

The next morning, Ingels pays a visit to the BIG design team working on Two World Trade Center, which has recently moved into a studio at Silverstein's headquarters, at the developer's request. As Ingels begins to review a wall covered with diagrams and illustrations, Ute Rinnebach briefs him about the lobby, where his ingenious solution to the foundation problem—the "Libeskind-esque" sloping columns—has proven expensive. Ingels worries that the cheaper alternative, straight columns, would leave the lower floors cluttered with obstructions. But Rinnebach recommends straightening things out. "I could live with that," Ingels concludes. "If we really want the truth, this is the truth. This is the truth in dollars."

The words are hardly out of his mouth when Janno Lieber drops by to reinforce the point. "I think we would welcome design ideas from you guys," he says. "But the real issue, Bjarke, is not any design aspect. It's really just about the cost."

"Nobody wants to pay \$12 million to \$15 million more for structure," Ingels assures him.

After Lieber leaves, the design team moves on to discussing the lobby's aesthetics. Many sentences begin with "James wants," referring to the younger Murdoch. "James has this Pacific Northwest aesthetic, like lumber and concrete," Ingels says. Even as he seeks to satisfy his patron, however, Ingels is also thinking about making his metaphors, assembling his narrative. "I think one thing that is the typical criticism of the big corporate skyscraper is that it's unwelcoming, right?" he says, going off on an improvisational riff. "Maybe there is a way that this could be a friendly skyscraper." He suggests using materials like brass and cobblestones, which would evoke old New York. "It's got a good story to it," he says.

Architects don't get to write their own endings, but Ingels says he is content to work within pragmatic boundaries. "A lot of the starchitects have started their careers doing some high-end sculptural projects," he tells me one morning, as he digs into a plate of eggs at a fashionable restaurant in Tribeca. "When they suddenly get faced with something that is more governed by the parameters of the practical, they end up almost petrified or paralyzed, because their usual repertoire doesn't work."

Ingels aspires to be a different kind of architectural star. He likens the challenge of realizing his skyscraper design to "solving a gigantic equation with multiple variables, where a lot of the variables claim to be fixed. You must find out which of the ones are actually variable." We walk into the sunny morning, ambling down Greenwich Street in the direction of the World Trade Center. Ingels makes a box in the air with his hands and clicks his tongue like a camera shutter.

"Imagine, that's where it's going to sit," he says. "I think it's going to be pretty epic." ■

## COLOPHON

### SPACES THAT HELPED GET THIS ISSUE OUT:

The secret burrito compartment in my car's dashboard; the crack between the bed and the wall; Tamarindo Beach; the distance and spaces between me and Celine Dion ("penny whistle solo"); Buddhify; sitting around, underneath, and next to my desk; the fourth dimension in *Miegakure*; Planck length (makes my tiny apartment seem big); Mike Judge's *Office Space*; the red booth in the kitchen; *The Astronaut Wives Club*; the platform under the dock slats that saved my debit card from Floras Lake; the Catalano-Chase Youth Hostel; an uncomfortable amount of white space; the Panticapaeum Institute; the Cow Palace; my superchill new bedroom; turning my chair to enjoy the view from 1WTC; "the space between the wicked lies we tell"; the crying room; the weekend.

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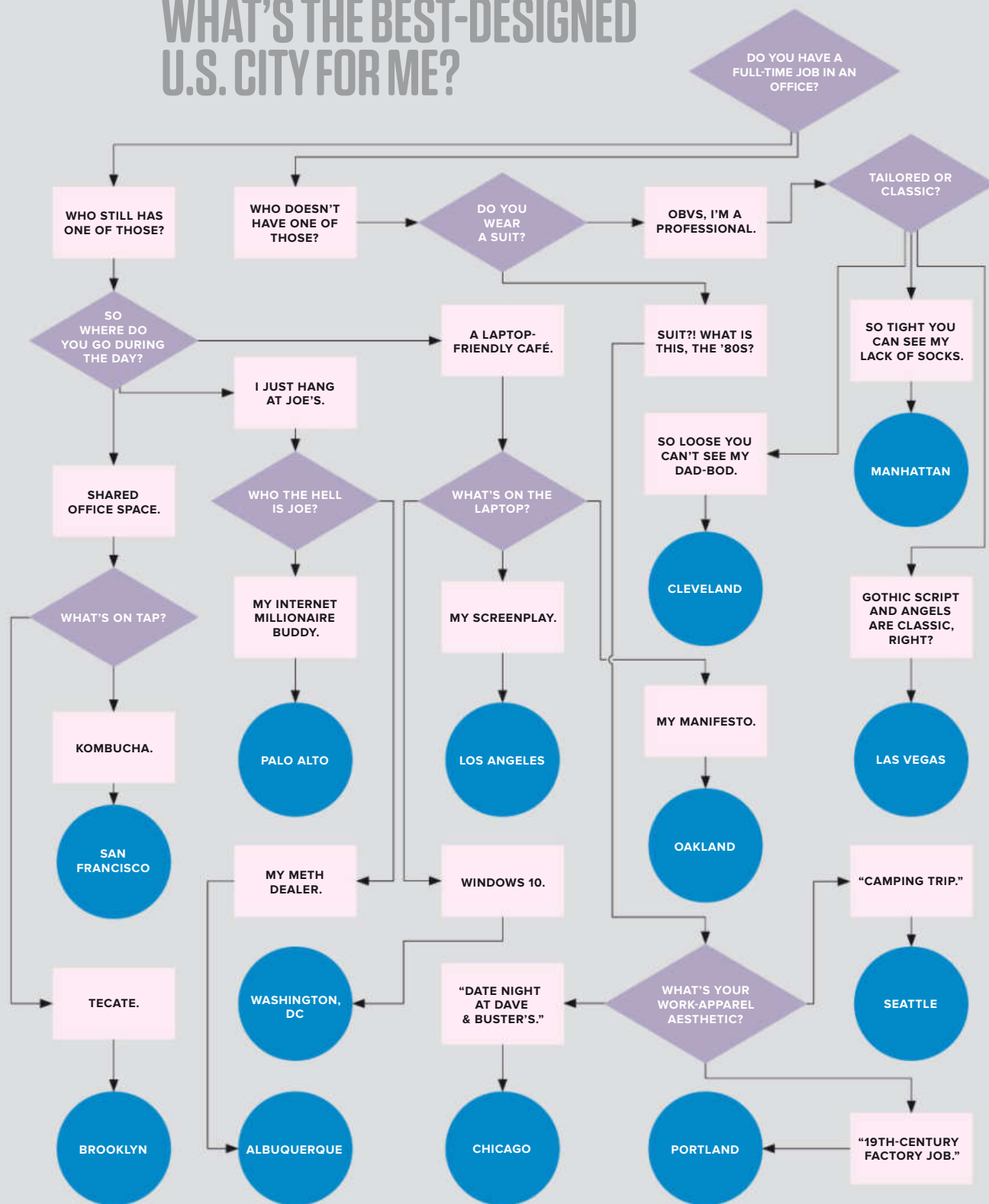
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